

UVic knowl**EDGE**

The art & science of keeping the music alive

by Margaret Milne

“A LOT OF PEOPLE have the misconception that you can be either an artist or a scientist, but not both,” says Dr. Andy Schloss. “That’s just not true.”

Schloss should know. The School of Music professor and his long-time collaborator, Dr. Peter Driessen of the Department of Electrical and Computer Engineering, have recently received a landmark grant from the Natural Sciences and Engineering Council of Canada and the Canadian Council for the Arts to investigate the fusion of art and science. Using the science of gesture recognition and the art of sound mapping, they are out to explore the future of musical instruments.

At the heart of the project is the radio drum. Created at Bell Labs in the 1980s, the instrument consists of two conventional-looking drumsticks and a flat foam-covered pad. When connected to a computer, moving the sticks above the pad generates sound.

“The radio drum is like a three-dimensional computer mouse,” explains Driessen. “It senses position in space.” This is done through small radio transmitters embedded in the drumsticks. The pad is equipped with four antennae, one in each corner, to

receive the signals coming from the sticks. “The antennae compare the strength of the signals to determine the position of the sticks,” says Driessen. “We translate the motion of the performer to electrical signals.”

Those electrical signals are then mapped to sounds by a computer. Exactly what sounds depends on the details of how Schloss and Driessen have programmed the instrument.

Schloss has had great success with the radio drum, performing across Europe and North America since 1988. Now the pair want to improve things. “We want to make the radio drum more sensitive,” says Driessen. “There needs to be enough of a challenge that you can become a virtuoso.”

When an instrument is too simple, Driessen explains, there’s no room for an artist’s musicianship to shine. That’s why there’s no such thing as a kazoo virtuoso.

In this work, Schloss and Driessen are exploring the deeper question of what makes a musical instrument musical. “In acoustic instruments, gesture and sound generation are linked,” Schloss explains. “The power of using computers is that anything can happen from any gesture. But this is also the problem,”

he adds, “that anything can happen from any gesture!”

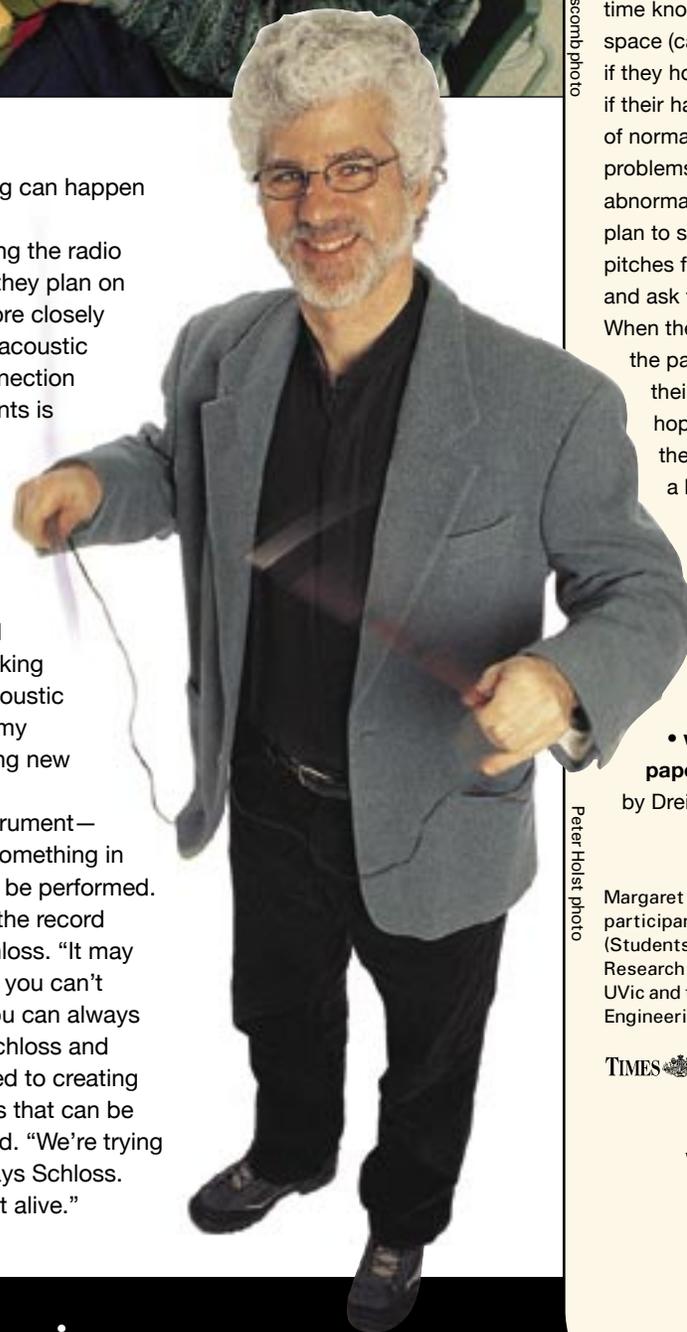
In addition to making the radio drum more sensitive, they plan on aligning its sounds more closely to those of traditional acoustic instruments. That connection to traditional instruments is important to Schloss and Driessen’s work.

“My reference is always real acoustic instruments,” says Schloss. “These are the best instruments. I have no interest in making cheap imitations of acoustic instruments; they are my inspiration when forging new musical territory.”

In the end, any instrument—acoustic, electric, or something in between—is meant to be performed. “The Internet may kill the record companies,” says Schloss. “It may get to the point where you can’t sell recordings. But you can always sell performances.” Schloss and Driessen are committed to creating music and instruments that can be performed and enjoyed. “We’re trying to maintain music,” says Schloss. “We’re trying to keep it alive.”



Driessen (above) and Schloss



Robie Uiscomb photo

Peter Holst photo

Facts from the **EDGE**

- The gesture recognition technology used in the radio drum has many applications beyond the field of music. For example, Driessen and Schloss are working with UVic psychologist Dr. Janet Bavelas, who, in her research on verbal and nonverbal communication, studies the gestures people make while talking. By using gesture recognition techniques like those in the radio drum, they can measure gestures with great precision as they are being made.
- They are also starting a project with Queen Alexandra Hospital for Children to work with patients who have a very hard time knowing where their bodies are in space (called *proprioception*). For example, if they hold their arms out, they can't tell if their hands are at the same height. Lack of normal proprioception can lead to joint problems, falls, and problems related to abnormal posture. Schloss and Driessen plan to set the drum to play different pitches for different heights of the sticks and ask the patients to raise the sticks. When the sounds from both sticks match, the patients will know they've moved their arms to the same height. They hope that this audio feedback will help the patients train themselves to have a better sense of their body position.

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- www.radiodrum.com includes MP3 tracks of Schloss performing with the radio drum.
- www.ece.uvic.ca/~peter/papers.html includes copies of articles by Driessen and Schloss on their project.

Margaret Milne wrote this as a participant in the SPARK program (Students Promoting Awareness of Research Knowledge), funded by UVic and the Natural Sciences and Engineering Research Council.



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