

## TECHNOLOGY MIGHT BE THE KEY



CHRIS MIKULA, THE OTTAWA CITIZEN

University of Ottawa professors Gilles Comeau, at the piano, and Pierre Payeur, are developing sensing technology to help prevent piano-playing injuries. STORY PAGE C6

# Professors tune in to musicians' pain

## Carpal tunnel syndrome, other conditions could be eased using new imaging system

BY ANDREW MAYEDA

As a music teacher, not a doctor, Gilles Comeau used to feel helpless when his students complained about pain in their shoulders and arms from playing the piano.

So it was a good thing he ran into Pierre Payeur, an expert in computer vision and imaging systems.

The unlikely duet of University of Ottawa professors are developing sensing technology to help prevent piano-playing injuries and to bring piano teachers into the 21st century.

"It was amazing to me how limited were the means to evaluate student performance," said Mr. Payeur, an assistant professor at the university's School of Information Technology and Engineering.

"Teachers sit on one side of the student, so they don't see everything."

Mr. Payeur and Mr. Comeau met about a year ago at a conference much like yesterday's research showcase on health technologies, where they presented their work.

Bodily harm doesn't usually come to mind when one thinks of playing a musical instrument. But the repetitive movement of strumming a guitar or finessing a keyboard can lead to a number of injuries, including tendinitis and carpal tunnel syndrome.

According to one study, 61 per cent of professional musicians and 45 per cent of students suffer playing-related health problems. In some cases, they can be career ending.

However, little empirical research has been done. Teachers either enforce old-school rules on posture and technique, or borrow from the prescriptions of office ergonomics, said Mr. Comeau, an associate professor at the university's Department of Music.

Most musicians simply grin and bear the aches and pains.

In the summer, the two professors

started work on a non-invasive system that would allow them to capture images of students playing the piano.

Hooking up pianists to a tangle of cords and sensors wasn't an option.

"When you have to produce fine movements, you don't want to have targets or sensors mounted on yourself," Mr. Payeur said.

Instead, they set up a group of cameras around the players to record their movements. Cameras on either side capture the movement of the hands, while one above picks up lateral motion and one positioned behind records posture.

Those images are fed into a computer, which renders a 3D image of the movements. Infrared sensors installed in piano keys measure the pressure exerted on the keys and other factors.

The professors hope to combine sensor data with the rendered images to provide a virtual, real-time representation of performances. Teachers can analyse the results to see if students slouch in their seat or pound the keyboard too hard.

Early tests have been encouraging. The next step is designing the software to bring it all together.

They plan to hire students this summer to work on a prototype, which will be tested in the new \$1.2-million Piano Pedagogy Research Laboratory at the University of Ottawa.

The lab was built with funding from the Canadian Foundation for Innovation and the Ontario Innovation Trust. The project also received support from the university and Yamaha Canada Music Ltd.

Supporters hope the system will be a handy tool for piano teachers, who could use it to analyse technique and posture on the spot. They also see it extending to the home, where students could use their web cam and PC to monitor their own progress, or being used in long-distance instruction.