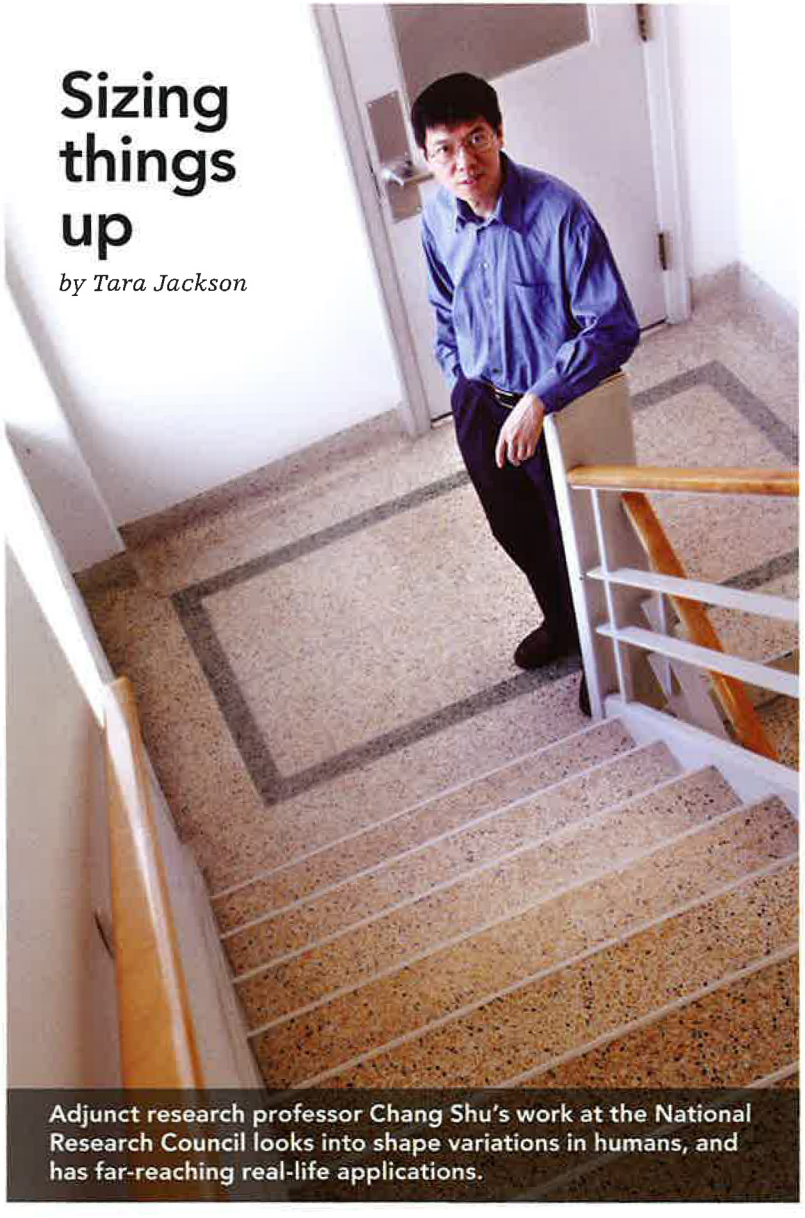
Sizing things up

by Tara Jackson



Adjunct research professor Chang Shu's work at the National Research Council looks into shape variations in humans, and has far-reaching real-life applications.

The human form comes in all shapes and sizes — differences that make us each unique. That variety compelled one Carleton researcher to develop geometric and statistical methods to better understand those shape variations. The application, applied to both human and other biological forms, has uses in ergonomic design, medical research, and even entertainment.

Chang Shu is an adjunct research professor in Carleton's School of Computer Science, and leads the Digital Human Modelling Project at the National Research Council of Canada, where he works to digitize real-world objects and process the data obtained from them.

Shu creates mathematical models for his prototypes, which include statistical information, such as measurements from a sample number of humans. The resulting model can describe the variability of the human shape with just 50 parameters.

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"We need to know all the ways people vary from each other in order to create the maximum efficient shape," explains Shu.

That efficient shape allows for flexibility in the design process, Shu says. For example, traditional measurements are limited by traditional tools, such as a tape measure that captures the length of a forearm, or circumference of a head. But Shu's computer measurements provide more complete and detailed shape information, allowing for a 3-D rendition of the model. This means that a company designing a bicycle helmet or a protective face mask could utilize a computer-generated model to test for fit and wearability of its product at the conceptual stage, saving time and money.

"Essentially, it puts the human element into the design early on and optimizes the process," says Shu.

Shu's team is also developing tools for the health care experts who are keen to reduce the number of X-rays scoliosis patients must endure. Taking intricate measurements of the outside of the body and comparing them over time will allow doctors to detect spinal changes without exposing the patient to potentially harmful radiation.

Additional applications for Shu's research can be found in the fields of security — including compiling forensic detail to digitally recreate suspects or victims — and entertainment, where realistic computer-generated characters can be inserted into films or video games.

While Shu is kept busy with his work outside of Carleton, he says his collaboration with the school's Computational Geometry Lab and opportunity to teach provides a unique balance to his career.

"I'm happy to give students useful advice about the working world," he says.