

INNOVATION



We can all thank innovators for giving us the quality of life we've come to expect. In the 21st Century, the commercialization of theoretical science will be more important than ever.

Norman Augustine recently remarked in Forbes magazine on America's great history of innovation in science and engineering.

He pointed firmly to this tradition of knowledge as the reason his country enjoyed unparalleled success and advancement in the 20th century.

But he's worried.

He sees waning investment and awareness of science and engineering among youth as a real danger that puts America, and likeminded countries, at risk of falling behind the curve in human development.

The commercialization and application of proven theoretical science is vitally important. Luckily for us, it's part of what we do.

PhD candidate Michael Gray and Prof. Constantin Christopoulos, for example, have developed a new earthquake damping mechanism designed to help

dissipate the forces of shaking in large, steel buildings.

The device itself (above) looks like two giant steel toothbrushes, bristles aimed toward each other in a firm embrace of the building's normal steel girders.

"There's bending in the fingers," Gray explains. "They flex back and forth in the earthquake and they save everybody."

While the actual science behind the device is just a bit more complicated than that, Gray's assessment of the creation's effectiveness is right on.

Buildings, especially large ones, are designed with movement in mind.

"Shaking only causes real damage and kills people when the structures that people are occupying collapse," offers Prof. Christopoulos. In other words, the more we can get a building to respond dynamically to earthquake movement without failing, the better.

A building that moves a lot without falling over could, potentially, withstand even the most powerful quakes.

The giant steel mechanism is attached diagonally to the floor and ceiling of a building. One end is fixed to the superstructure. The steel fingers on the other end are designed to grab and hold on to the earthquake's vibrations, dissipating the force throughout.

We recently tested the invention in real-time in our newly renovated Structural Testing Facility, complete with one of North America's largest hydraulic actuators.

A mock building frame meant to imitate one floor of a larger building was constructed, the arm installed.

Then entire apparatus was bombarded with forces equivalent to those you would have felt had you been about 40km away from the epicenter of the devastating 7.0 Haitian earthquake last year.

IN MATTERS



VIEW THE
DISCOVERY
CHANNEL
DOCUMENTARY

online at
www.civ.utoronto.ca

If that weren't enough to make you nervous: we invited the press.

The quake lasts about 20 seconds, creaking and flexing the apparatus in seemingly chaotic, unpredictable jolts. Imagine feeling that on the 60th floor of your office tower.

"No one died today," declares a beaming Gray, whose invention, the data shows, would have saved

everyone inside.

Hundreds of tiny sensors proved that the invention took some serious punishment, but would have kept the structure standing.

This invention is being commercialized by Cast Connex Corporation.

Coming soon to a building – hopefully near you. ◆



Featured Volunteer

JIM BURGESS (CIV5T6)

Jim Burgess, who has been Civil Engineering Class of 1956 president for life since graduating from the Faculty of Applied Science and Engineering, has fostered a life-long bond between that class and the University of Toronto. Jim was instrumental

in establishing the 5T6 Civils Scholarship. The award has made annual gifts since 1964 to a second-year civil engineering student, with the current value being \$3,000. He has also organized annual class reunions since graduation.