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Laptops track Earth's shakes, rattles and rolls

PALO ALTO, CALIFORNIA

A seismologist at Stanford University in California has developed a computer program for tracking earthquakes in real time. It uses thousands of volunteers' computers and may someday be fast enough to issue warnings just before an earthquake strikes.

Quake-Catcher Network, as it's called, uses the accelerometers built into many new computers, which sense when a computer is dropped so that the hard drive can be shut down. But seismologist Jesse Lawrence found that the sensors could also pick up on more subtle movement. Thus was born the latest iteration in distributed computing, which turns the unused computing power of thousands of home computers into a giant supercomputer.

"Our approach is just to have massive numbers."

The most popular distributed computing program, SETI@home, searches for signals from extraterrestrial intelligence. Quake-Catcher looks instead at the inner workings of earthquakes. Little is known about how seismic waves travel and refract deep in Earth's crust, and modelling this movement accurately takes enormous computing power, which can be generated by combining many different users on the network.

But another of Quake-Catcher's jobs is to wait for an earthquake to happen. When a computer signed up to the program senses shaking, it calculates the intensity and pings the information back to the servers at Stanford in less than a second. If enough computers detect ground shaking in the same area, the system could send out a warning to users who haven't felt it yet that an earthquake is on its way, Lawrence says.

If it works, it will be the cheapest seismic network on the planet and could operate in any country. It wouldn't be as sensitive as traditional networks of seismometers, but Lawrence says that's not the point. "If you have only two sensors in an area, you have to have a perfect system. If you have 15 sensors in a system it [can] be less perfect. One hundred, one thousand, ten thousand — your need for the system to be perfect becomes much smaller," he says. "That's really our approach — just to have massive numbers."

To accurately target an earthquake of magnitude 5 or greater, Lawrence estimates that he would need at least 15 users in a 900 square-kilometre area near the epicentre. (SETI@home currently has more than 340,000 computers worldwide.)

The program also has a large educational component, in which students can drop heavy objects on the floor at varying distances from the computer to design and monitor their own earthquakes. Lawrence hopes that this function — with a US$30 plug-in accelerometer for computers that don't have one built in — will make it attractive to schools, increasing the network.

Currently, his team is in the final stages of testing the program and expects to offer it to the public this summer. ■

Erik Vance