

For \$110, this man built an earthquake warning system

Leslie Katz, Cnet.com, 9-8-14

A professor at UC Berkeley (in California's earthquake country) has created a prototype device that warns of pending quake-related rumbles and could be installed as easily as a home fire alarm.

If Josh Bloom has his way, earthquake early-warning devices for the home will be as ubiquitous as fire alarms or carbon monoxide sensors.

And he's built one, for less than \$110 in parts, to show how easily they could be made and installed in quake-prone areas.

Bloom, an astrophysics professor at UC Berkeley, cobbled together a Raspberry Pi single-board computer, an SD card, wired power speaker, and mini Wi-Fi adapter for his low-power early-earthquake-warning (EEW) device, which can run for up to days at a time on a USB battery. The gadget taps data from the ShakeAlert system, a prototype EEW for California now being beta-tested by the Bay Area Rapid Transit System, Google, and about 40 California scientists and engineers, including Bloom.

Unlike Mexico, Japan, and a number of other countries, the United States doesn't have a nationwide EEW system in place. The ShakeAlert system, like other EEWs, aims to rapidly detect the initiation of an earthquake, estimate the level of ground shaking to follow, and issue a warning seconds after the rupture, before significant rumbling generated by the quake kicks in. Notification tweets and emails currently relay warnings, but within minutes, not seconds, after the dangerous seismic waves have arrived.

ShakeAlert detects earthquakes using the California Integrated Seismic Network of about 400 high-quality ground motion sensors. CISN is a partnership of the US Geological Survey, State of California, Caltech, and UC Berkeley.

Bloom's prototype has been in operation for 11 months, proving stable except for the time he changed his Wi-Fi network and forgot to reconfigure the device. But that's user error. Prior to the August 24 quake that shook Northern California, rattling Napa especially hard, Bloom's homemade device gave him about 5 seconds of warning at his family's Berkeley home before the shaking started.

"The recent 6.0 magnitude event was a reminder that it can work and that its widespread usage can save lives," Bloom wrote in a blog post about his device.

Five seconds might not sound like enough time to do much more than panic, but it can, in fact, provide a sufficient window in which to slow down trains, control elevators and factory lines, and place sensitive equipment in safe mode. It gives doctors and dentists time to halt delicate procedures and emergency responders time to open firehouse doors and prioritize

response decisions. And it enables the average Joe in Earthquake Country to do as instructed in grade school --drop, cover, and hold on.

"That's enough time to move away from windows. That's enough time to move away from an unfastened bookshelf and take cover. In the office, that would be enough time to gracefully (and automatically) shut down a computer system," Bloom told Crave.

Bloom envisions that an EEW device like his prototype could be installed on a home's wall or ceiling and connect wirelessly to a local network or networks to receive alerts from remote server systems about earthquakes and perhaps other approaching disasters. The professor -- who's also CTO ofWise.io, a company that makes machine-learning apps for the customer experience market -- cites radiation leaks, chemical spills, and even dirty bombs as the sorts of threats for which his prototype could ultimately issue alerts.

The gadget would measure about the size of a standard fire alarm, he says, and like other wireless-based home devices, could be configured through the cloud or a connected laptop. It could be updated over the air and would cost an estimated \$50, plus monthly subscription, and, he envisions, be sold at places like Home Depot and Target.

"For now the main obstacle is that there is no public, robust EEW system," Bloom told Crave. "It could be years before that is in place." (Last year, California passed a law mandating that the state find funding for an EEW by 2016).

Next up, Bloom hopes to finalize the external packaging and software setup procedure for his prototype, and make more of them that could be installed in his kids' classrooms and friends' homes to help raise awareness (and hopefully funding) of the device.

Since the August quake, Bloom's also added a tweet bot feature to his system that listens for new seismic events and gets the word out over social media. As of this writing, the account has yet to send any tweets, which for those of us living in earthquake territory is probably a really good thing.