Tiny sensor used in smart phones could create urban seismic network

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A tiny chip used in smart phones to adjust the orientation of the screen could serve to create a real-time urban seismic network, easily increasing the amount of strong motion data collected during a large earthquake, according to a new study published in the October issue of the *Bulletin of the Seismological Society of America* (*BSSA*).

Micro-Electro-Mechanical System (MEMS) accelerometers measure the rate of acceleration of ground motion and vibration of cars, buildings and installations. In the 1990s MEMS accelerometers revolutionized the automotive airbag industry and are found in many devices used daily, including smart phones, video games and laptops.

Antonino D'Alessandro and Giuseppe D'Anna, both seismologists at Istituto Nazionale di Geosifica e Vulcanologia in Italy, tested whether inexpensive MEMS accelerometers could reliably and accurately detect ground motion caused by earthquakes. They tested the LIS331DLH MEMS accelerometer installed in the iPhone mobile phone, comparing it to the earthquake sensor EpiSensor ES-T force balance accelerometer produced by Kinemetrics Inc.

The tests suggest that the MEMS accelerometers can detect moderate to strong earthquakes (greater than magnitude 5) when located near the epicenter. The device produces sufficient noise to prevent it from accurately detecting lesser quakes—a limitation to its use in monitoring strong motion.

D'Alessandro and D'Anna note that the technology is rapidly evolving, and there will soon be MEMS sensors that are sensitive to quakes less than magnitude 5. The real advantage, say the authors, is the widespread use of mobile phones and laptops that include MEMS technology, making it possible to dramatically increase coverage when strong earthquakes occur.

The current state of the MEMS sensors, suggest the authors, could be used for the creation of an urban seismic network that could transmit in real-time ground motion data to a central location for assessment. The rich volume of data could help first responders identify areas of greatest potential damage, allowing them to allocate resources more effectively.

More information: The article, "Suitability of low-cost three-axis MEMS accelerometers in strong-motion seismology: tests on the LIS331DLH (iPhone) accelerometer," is published in October issue of *BSSA*.

Provided by Seismological Society of America

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