Raspberry Shake

Watch the Earth move under your feet

BY JILL NUGENT

The physical science concept of forces is also found as a unifying theme in Earth science through the study of plate tectonics. *Plate tectonics* describes the main force and process that shapes Earth's surface over long periods of time. When students immerse themselves in the study of plate tectonics, they learn that *convection cell patterns* (patterns of heating and cooling) serve as forces that drive plate movement. Scientists use *seismometers* and *seismographs* (instruments that measure and record ground movement) to learn more about Earth science events, such as earthquakes. Raspberry Shake is an innovative citizen science project that invites students to study Earth surface movement through the use of classroom technology (see Figure 1).

FIGURE 1: The Raspberry Shake

Project goal: To monitor Earth motion and seismic activity around the globe

Your task: Monitor Earth motion from your classroom!

Science discipline: Earth science

Earth's surface is always in motion, and Raspberry Shake was developed to provide accessible technology for classrooms to monitor and study the movement of the Earth's surface in their geographic area. Raspberry Shake detects ground vibrations and displays a seismograph on the computer screen for immediate, real-time viewing. Seismic activity data are also shared on the Raspberry Shake website so that remote locations can view real-time data generated across the globe.

With the Raspberry Shake instrument, students will see seismographs generated from Earth's movement, whether the source is major earthquakes, minor local tremors, fracking activities, quarry explosions, eruptions, landslides, avalanches, nuclear testing, or even large

concerts and sporting events in your area. The instrument helps visualize data of Earth movement from "shakes" that occur in real time beneath your feet, even those ground movements that are not perceived by people. Upon installation of your Raspberry Shake, students will enjoy "testing" classroom movements on the seismograph (such as dropping a book on the floor or jumping in place). Students may also wish to capture an image or screenshot of the graph and see how the output changes depending on various floor impact movements.

The Raspberry Shake "plug and play" instrument comes ready to connect to a computer and functions right out of the box; the tool is composed of (1) a sensor that detects vibrations, (2) a circuit board that collects the data from the sensor, and (3) a Raspberry Pi mini-computer. (Note: If you already have a Raspberry Pi, you may be interested in the DIY version of the Raspberry Shake.) In addition, the Raspberry Shake instrument line is expanding, and so there are options available based on sensor types in the device (see "Raspberry Shake Shop" to explore options). Teachers may need to work with their technology department to properly set up additional instruments.

Materials you will need:

- a computer with internet access
- one Raspberry Shake (see "Raspberry Shake Shop"; both plug-and-play as well as DIY options are available)

Middle school classrooms across Oklahoma have started using Raspberry Shake in collaboration with the University of Oklahoma and the Oklahoma Geological Survey (OGS). The OGS is a statewide seismic monitoring network, and classrooms across the state are helping fill

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>
> *- Past NGSS Workshop Participant, Minneapolis, MN*

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gaps in data where monitoring coverage is currently limited. Classrooms are now actively contributing data on seismic activity throughout Oklahoma, and students are participating in real-world science collaboration with practicing scientists. Students serve as active participants in the groundbreaking science being done to study the relationship between fracking and earthquakes. The goal is to expand the program to 100 monitoring sites, including libraries and schools in Oklahoma. By engaging in Raspberry Shake citizen science, your classroom of "movers and shakers" will have access to their own high-tech geoscience research lab! ●

This column is the result of a partnership between SciStarter and the National Science Teachers Association. For more information about SciStarter and other citizen science projects, please visit *www.scistarter.com*.

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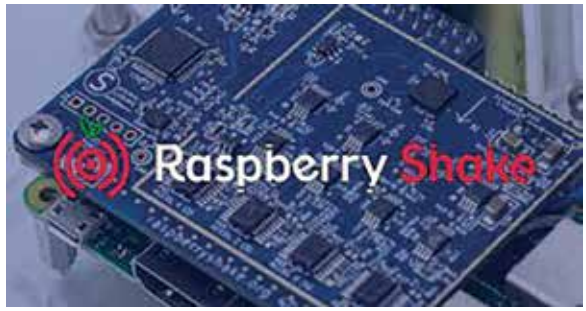
Raspberry Shake at a glance



When: Anytime

How: Acquire and plug in your Raspberry Shake instrument, and you'll be able to start monitoring seismic activity from your classroom.

Where: Global

Time needed: Varies (as much or as little time as desired)

Special equipment needed: One (1) Raspberry Shake (see "Raspberry Shake Shop")

Cost: One (1) "plug and play" Raspberry Shake (the original "RS1D" model) costs $374.99 (see "Raspberry Shake Shop")

Contact for more information: Raspberry Shake contact page, *https://raspberryshake.org/contact*

***NGSS* Connections:** Science practice (Obtaining, Evaluating, and Communicating Information)

Safety: As with any science lab, classroom, or field activity, always ensure that you are following recommended safety practices. For more information on safety in the science classroom, visit *www.nsta.org/safety*.

RESOURCES

Getting Started Manual—*https://manual.raspberryshake.org*

Network locations—*https://raspberryshake.org/community/station-view*

Project link—*https://raspberryshake.org*

Project link on SciStarter—*https://scistarter.com/project/19054-Raspberry-Shake*

Raspberry Shake Shop—*http://bit.ly/2lc8pfE*

- Plug and Play option—*http://bit.ly/2Q1azkW*
- Do It Yourself (DIY) option—*http://bit.ly/2zqS8AI*

SciStarter Educator Page—*https://scistarter.com/educators*

Video Tutorials—*https://raspberryshake.org/learn-support/video-tutorials*

View of Earthquake Locations—*https://raspberryshake.org/community/eq-view*