

Abstract Submitted  
for the OSF17 Meeting of  
The American Physical Society

**Designing Earthquakes for a Low-Cost Shake Table.**<sup>1</sup> FREDERICK THOMAS, ROBERT CHANEY, MARTA GRUESBECK, Sinclair Community College — A servo-powered shake table can be programmed to produce one-dimension scale versions of either real or user-designed earthquakes. Programmed using Excel-like algebraic functions, the table can replicate earthquakes with varying amplitudes (i.e., original Richter magnitude), different maximum accelerations (the primary basis for building codes), varying frequencies, alternative waveforms and more. In addition to teaching about the differences among displacement, velocity and acceleration, the table can assist in teaching about periodic and non-periodic motions. A sample 2-part activity asks students to (1) design and build a structure which can withstand a Richter magnitude 5 earthquake, then (2) design a magnitude 4 earthquake to destroy the structure. Since the Arduino family board incorporates a micro SD card, the system can store and replay thousands of alternative motions. Plans for building the table are provided, along with an executable LabVIEW control program and the necessary sketch for implementation via a ChipKIT WF32 board.

<sup>1</sup>Based in part on NSF-ATE Grants No. DUE-0202202 and DUE-1003381

Frederick Thomas  
Retired

Date submitted: 14 Sep 2017

Electronic form version 1.4