

WebSights features announcements and reviews of select sites of interest to physics teachers. All sites are copyrighted by their authors. This column is available as a web page at PhysicsEd.BuffaloState.Edu/pubs/WebSights/. If you have successfully used a physics website that you feel is outstanding and appropriate for WebSights, please email me the URL and describe how you use it to teach or learn physics—macisadl@buffalostate.edu.

• **Physics students experience authentic stunt-action at a motion-capture studio in Toronto**

fastmotionstudios.com/physicsworkshop

Toronto-based FAST Motion Studios—specializing in video stunt and fight action—have spent several years putting STEM students through their paces as stunt performers. A special priority has been on high school physics classes, with a program designed and managed by former OAPT President Dave Doucette. Student teams choreograph a brief stunt sequence and act as stunt actors while filming the results. Professional stunt coordinators and riggers ensure the action is safely performed and provide invaluable feedback on production quality. Students are inspired to pursue college/university STEM fields and to consider specializing in this physics-anchored industry. The studio webpage includes a five-minute video of simple wire-rigging stunts students perform at the site (do not try this at home!). A 20-page question-and-answer pdf, tied specifically to the video, is available—contact dave@fastmotionstudios.com. Though a field trip is not practical for many TPT readers, the prevalence of stunt-action footage on YouTube, etc. can be the basis for rich physics analysis.

Submitted by Dave Doucette, past president of the Ontario Association of Physics Teachers

• **Real-world electricity: Understanding what's happening in your walls and on the electrical grid**
"Practical Engineering: Power Grid" video series on YouTube

tinyurl.com/WS-PEpowergrid

youtube.com/user/gradyhillhouse/featured

• **"The Engineering Mindset: Energy Engineering Basics" video series on YouTube**

tinyurl.com/WS-TEnggM

These YouTube channels are particularly appropriate for nonmajors learning applied E&M, such as technology majors who need to know practical things about their electrical environment (and maybe a little home wiring). These videos use industry-standard everyday locutions (e.g., "AC electricity flows from hot to return through the bulb") that are common outside the physics classroom (we physicists know electrons just move back and forth in the filament due to surface charge gradients changing at the wire surfaces driven by oscillating electric fields produced by the generator). But such is the world we and our students live in—dictated by external standards, historical models, and appropriate models for appropriate situations and students. To give the The Engineering Mindset (TEM) narrator credit, he often discusses limitations to and simplifications of the presented models (DC rather than AC, water circuit analogies, etc.). If you are a purist, and non-physics-standard language or simplified/incomplete

models offend you (something I call Occam's razor for conceptual model deployment), you might avoid these videos. Budding electricians and engineers will love them.

Civil engineer Grady Hillhouse's "Practical Engineering" series on the power grid includes "How Does the Power Grid Work?" "How Electricity Generation Really Works," and "How Do Substations Work" to date. "The Engineering Mindset's" series titled "Energy Engineering Basics" and "Electrical Engineering Basics" discuss three-phase electricity, household wiring basics like "Ground, Neutral and Hot," "120V and 240V Electricity: Split Phase 3 Wire" (particularly good for understanding your breaker panel and the external service line to your home), "Power Factor," and "What is a kWh?" There are other household electric videos like "How Receptacles Work," three- and two-way switches, etc. that are both useful, interesting, and practical. TEM also has extensive videos on refrigeration and HVAC systems.

• **Perimeter Institute for Applied and Theoretical Physics releases new freely downloadable curricular modules: "Contemporary Physics" and "Fields"**

landing.perimeterinstitute.ca/back-to-school-in-a-big-way
Both these PI curricula are intended for Ontario Grade 12 High School students and include teacher's guides and lesson plans keyed to Ontario Standards (regretfully, no NGSS yet), worksheets, hands-on activities, challenges, videos, answer keys, templates, etc. The multi-part, one-hour activities are designed around cooperative learning groupwork, and can be mixed or used standalone. I was very impressed with the effort to take these mathematically demanding contemporary physics conceptual topics into the high school classroom in a nonthreatening manner, and with the large variety of hands-on activities and approachable storyline.

"Contemporary Physics" includes a video and six activities exploring gravitational energy wells and spacecraft gravitation navigational assists, particle detectors at CERN, Heisenberg's uncertainty principle (HUP), special relativity (two activities via SpaceTime geometry), and a semi-classical model of the hydrogen atom.

In "Fields," five hour-long activities and one design challenge first introduce and develop the concept of noncontact interactions and fields via video. Then hour-long hands-on activities explore E-fields between point charges and parallel plate electrodes (9V battery, LED and tap water); Maxwell's equations are presented; magnetic fields and aurorae are explored; gravitational fields, general relativity, and the precession of Mercury's orbit are examined (via paper cones); and an MHD (MagnetoHydroDynamics—more saltwater, electrodes, and magnets) propulsion system challenge is provided.

Submitted by Greg Dick, contact@perimeterinstitute.ca