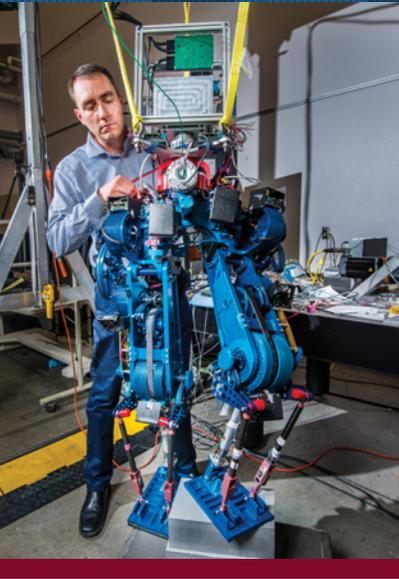


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# Sandia News Tips

## Hydrogen fuel cell unit to provide green, sustainable power

Clean hydrogen power that's expected to lower emissions and reduce energy consumption will be coming to the Port of Honolulu in 2015 after the completion of a new fuel cell technology demonstration, one that could lead to a commercial technology for ports worldwide. Hydrogen researchers at Sandia in Livermore, Calif., joined with several partners in the follow-up project, aimed at a portable, self-contained hydrogen fuel cell unit that can float on a barge, sit on a dock or be moved to wherever it's needed to provide electrical power.

## Magnetized fusion technique produces significant results

Researchers at Sandia's Z machine have produced a significant output of fusion neutrons. The experimental work is described in a paper published in the Sept. 24 *Physical Review Letters* online. Another, more theoretical *PRL* paper helps explain why the experimental method worked. The combined work demonstrates the viability of the novel approach. Sandia senior manager Dan Sinars expects the project, dubbed MagLIF for magnetized liner inertial fusion, will be a key piece of Sandia's submission for a July 2015 National Nuclear Security Administration review of the national Inertial Confinement Fusion Program.

## Getting bot responders into shape

Sandia is tackling one of the biggest barriers to using robots in emergency response: energy efficiency. Through a project supported by the Defense Advanced Research Projects Agency, Sandia is developing technology that will dramatically improve the endurance of legged robots, helping them operate for long periods while performing the types of locomotion most relevant to disaster response. A Sandia robot that showcases this technology will be demonstrated at an exposition

during the DARPA Robotics Challenge Finals in June. Sandia's robots won't compete, but could ultimately help winning robots extend their battery life.

## Pocket-sized anthrax detector aids global agriculture

A credit-card-sized anthrax detection cartridge developed at Sandia and licensed to a small business makes testing safer, easier, faster and cheaper. *Bacillus anthracis*, the bacteria that causes anthrax, is commonly found in soils all over the world and can cause serious, often fatal, illness in both humans and animals. Melissa Finley's research in Sandia's International Biological Threat Reduction Program inspired the detector, named BaDx (*Bacillus anthracis* Diagnostic).

## Tracking nuclear warheads for arms control

Sandia and others are developing systems to track the movements of nuclear warheads through their lifecycles for arms control purposes. The research, funded by the National Nuclear Security Administration, could inform arms control negotiators of possible technological solutions as they begin work on the successor agreement to the New Strategic Arms Reduction Treaty. Sandia and partners have developed a test bed to support arms control technology experiments and demonstrations.

## Adaptive zoom rifle scope prototype: push-button magnification

When an Army Special Forces officer-turned engineer puts his mind to designing a military rifle scope, he doesn't forget the importance of creating something for soldiers that is easy to use, extremely accurate, light-weight and has long-lasting battery power. Sandia optical engineer Brett Bagwell led the development of the adaptive zoom rifle scope prototype. At the push of a button, the scope can toggle between high and low magnifications, enabling soldiers to zoom in

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## Sandia News Tips

without having to remove their eyes from their targets or their hands from their rifles. The technology is available for licensing and is ideal for applications where speed, size, weight and power count, such as medical imaging, binoculars, hunters' scopes and cell phone cameras.

### MINER shines in urban emergency response exercise

A nuclear device is hidden in a high-rise building in a major metropolitan area. Emergency responders have intelligence that narrows down the location to a city block, but it isn't safe to search door-to-door. Can they identify the exact location quickly without the culprits realizing a search is on? Sandia's mobile imager of neutrons for emergency responders (MINER) system did just that at an emergency response exercise in downtown Chicago.

### In-flight sensor: moving toward monitoring for safer flights

Nine commercial aircraft flying regular routes are on the frontier of aviation safety, carrying sensors that monitor their structural health as well as routine maintenance. The flight tests are part of a Federal Aviation Administration certification process that will make the sensors widely available to U.S. airlines. Delta Air Lines Inc. and a foreign aircraft manufacturer have partnered with Sandia in two separate programs to install about 100 sensors on their commercial aircraft. Sandia intends to present its test results to the FAA this year.

### Better prosthesis: sensors and system to make fit better

As an amputee walks on a prosthetic leg during the day, the natural fluid in the leg shifts and the muscles shrink slightly, changing the fit of the prosthesis. Sandia researcher Jason Wheeler is part of an Intelligent Systems, Robotics and Cybernetics group working to develop a sensor to tell how a limb changes, along with a system that automatically accommodates those changes. After additional testing and refinements, Wheeler hopes to find a company to market the sensor system.

### Tech transfer program shares Sandia science

For 20 years, Sandia researchers have been able to leave to start or join small companies, knowing they can return. Their work has made a difference: creating jobs, bringing Sandia expertise into the private sector and boosting economic development. Jackie Kerby Moore, Sandia's manager of Technology and Economic Development, says the Entrepreneurial Separation to Transfer Technology (ESTT) program has many successes and has demonstrated positive economic impacts.

### Nanoparticle method could mean better lights, solar cells

Sandia has developed an inexpensive way to synthesize titanium-dioxide nanoparticles and seeks partners to demonstrate the process at industrial scale for everything from solar cells to light-emitting diodes (LEDs). Titanium-dioxide (TiO<sub>2</sub>) nanoparticles show great promise as fillers to tune the refractive index of anti-reflective coatings on signs and optical encapsulants for LEDs, solar cells and other optical devices.

### Turning cells to stone improves cancer, stem cell research

Sandia's new technique to transmute living cells into more permanent materials that defy decay and can endure high-powered probes is widening research opportunities for biologists developing cancer treatments or tracking stem cell evolution. The simple, silica-based method also offers materials scientists the ability to "fix" small biological entities like red blood cells into more commercially useful shapes. In theory, the method can transmute naturally grown objects like livers and spleens from livestock into non-organic "zombie" replicas that function simultaneously from macro to nano scales.

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