

A SLIDE THAT'S OUT OF THE ORDINARY— Researcher George Bachand peers into the eyepiece of a confocal microscope illuminating the first biomolecular machines to assemble complex polymer structures. Off colleague Wally Paxton's right shoulder is the image of a nerve-like assemblage created by protein nanomotors acting on polymer filaments. (Photo by Randy Montoya)

**Crowdsurfing motor proteins create nerve-like polymer networks**

Sandia researchers have created linkages of polymer nanotubes that resemble the structure of a nerve, with many outthrust filaments poised to gather or send electrical impulses. Read about this breakthrough work in a story by Neal Singer on page 5.

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**Sandia LabNews**



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# Red and White Fleet going green

*Sandia leads partnership to develop hydrogen fuel cell ferry and world's largest refueling station*

By Patti Koning

**W**hen it comes to environmental sustainability, Red and White Fleet president Tom Escher is all in.

“Everyone is talking about reducing emissions by 20 percent, 40 percent, or more,” he says. “I thought, ‘Why not do away with emissions altogether?’”

Sandia, which recently signed a cooperative research and development agreement with Red and White Fleet, is helping the San Francisco-based company realize that goal. Named SF-BREEZE (San Francisco Bay Renewable Energy Electric vessel with Zero Emissions), the project aims to eventually design, build, and operate a high-speed hydrogen fuel cell passenger ferry and hydrogen

*Continued on Page 3*

SANDIA AND SAN FRANCISCO'S Red and White Fleet are partnering to develop a high-speed, hydrogen-fuel-cell-powered passenger ferry and refueling station.

(Photo courtesy of Red & White Fleet)



**Sandia interns**

Summer is a busy time for Sandia's 1,100 interns. In addition to project work and meetings with mentors, interns stay engaged with a host of activities designed to make their experience at the Labs useful and rewarding. See story on pages 6-7.

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**Lab to Market**

Sandia won four regional awards from the Federal Laboratory Consortium (FLC) for its work in tech transfer. One of them honored business development specialist Bianca Thayer (8539) as Technology Transfer Professional of the Year. See page 12.



## That's that

A bunch of us the other day were talking about generational differences at Sandia and how they shape our workforce.

We're told the workplace is getting both older and younger as experienced individuals defer retirement and younger people with 21st century-specific skills are being brought into the workforce earlier than ever, often as interns.

As a result, we could actually see five generations working side by side: so-called Traditionalists (born before 1945); Baby Boomers (1946-1964); Gen-Xers (1965-1985); Millennials (1986-2001); and Gen-Zers (born after 9/11).

We don't have many Traditionalists left at Sandia and the Gen Z cohort is just on the cusp of beginning to come in as high school interns. We have plenty of Boomers, Gen-Xers, and Millennials, though, at various stages of their careers.

According to the literature, this generational mix is going to create some challenging new dynamics for managers to sort out. Experts say – at least some do – that the different generations are motivated by different things and that the good manager knows how to push the right generational hot buttons to get the most effective response from each team member.

Based on our discussion that day, my sense is that concerns about managing generational differences may be a bit overblown, more relevant culturally than in terms of mission execution and mission success.

Sure, there are some obvious cultural differences: My taste in music ossified back around the time of Woodstock. The supergroup Cream still sounds very fresh to me. Other members of our team, astonishingly, aren't familiar with *Tales of Brave Ulysses* or *Sunshine of Your Love*. On the other hand, I have no clue about the music – or as an old codger, am I expected to say “music” with air-quotes? – of some groups that have been hugely popular at one time or another over the past 30 years or so. In my salad days, we didn't actually eat much salad. Our go-to food was pizza and not the artisanal stuff with broccoli and goat cheese, either. My kids love Thai food and sushi. Speaking of which, I only recently tried sushi for the first time. It was okay, but it wasn't Ocean City, Maryland, boardwalk pizza, of which there is none better.

In my own efforts to manage these cultural differences, I've learned it doesn't win me any friends to exclaim to someone a generation (or two) removed from me: “What!?! You've never seen *Treasure of the Sierra Madre*?”

So, yeah, there are some generational differences but more at the margins than at the core. Some broad assertions – Baby Boomers expected to hire on with a company (or laboratory) and stay with it for 35 years, while Gen-Xers take it as a given that they'll move from job to job throughout their working life – don't even begin to paint a complete picture.

As with most generalizations there is some truth to them in the macro sense but they tell you nothing about individuals. My observations of our own small team tell me that when it comes to what we do at work we are strikingly similar. At the end of the day, we all want to excel, we want the Labs to succeed, we believe in our mission, and we all know we can learn from each other.

One of our more insightful watercooler philosophers dismissed the generational issue out of hand. “Look,” he said, “at Sandia, it doesn't matter whether you're a Boomer, a Gen-Xer, or a Millennial. What counts here is whether you're an Annual or a Perennial.”

We all laughed as he explained his point: The Annuals come here, last for a season, maybe even bloom brilliantly, but decide, for whatever reason, not to put down permanent roots.

The Perennials find fertile ground here – an urgently important, consequential mission in service to the nation, exceptional colleagues of often world-class reputation and accomplishment, the best equipment, a chance to have multiple careers under one roof (so to speak), better-than-decent benefits including some unique factors (like 9/80 workweeks), an environment that accommodates work-life flexibility considerations – and decide to make this place their home. These are the folks who blossom year after year.

I suspect all of us have been Annuals at one time or another in other jobs. I know I sure have. But it didn't take long, once I got to Sandia, to realize that here, in this place, I wasn't a Boomer, I was – am – a Perennial.

See you next time.

– Bill Murphy (MS 1468, 505-845-0845, wtmurph@sandia.gov)

## Council on Competitiveness announces Paul Hommert as Distinguished Fellow



PAUL HOMMERT

The Council on Competitiveness has announced just-retired Sandia President and Laboratories Director Paul Hommert as a Distinguished Fellow of the council.

As a Fellow, Paul, who retired from Sandia on July 16, will be part of efforts to establish frameworks for the future of innovation, advance US manufacturing and energy leadership, and promote council perspectives in the US and abroad. The announcement was made July 31. He joins a diverse group of scientific and policy experts, including Eric Bloch, former director of the National Science Foundation; Daniel Goldin, former NASA administrator; and former US Rep. Bart Gordon, who was chairman of the House Science Committee.

### Committed to American prosperity

“The Council on Competitiveness is a strong voice for shaping America's economic future and building the frameworks for continued US prosperity,” Paul said. “I am proud to join the Council on Competitiveness and look forward to contributing to new thinking on the intersection of applied sciences and economic competitiveness.”

The non-partisan council, made up of corporate executives, university presidents, labor leaders, and directors of national laboratories, is committed to the future prosperity of all Americans and to enhancing US competitiveness in the global economy.

“With nearly 40 years of professional experience in applied sciences, Dr. Hommert will bring extensive knowledge of engineering and scientific development to the council,” said Deborah L. Wince-Smith, president and CEO of the Washington, D.C.-based organization.

“We are honored to have someone with his leadership skills and innovative ideas as part of our work to enhance economic growth and competitiveness.”

Paul joined Sandia in 1976 as a member of the technical staff, leading programs supporting energy research. In the 1990s, he was Sandia's director of engineering sciences. He served as director of research and applied science at the United Kingdom's Atomic Weapons Establishment from 2000 to 2003, where he led the science and engineering department responsible for the United Kingdom's nuclear deterrent. From 2003 to 2006, Paul led Los Alamos National Laboratory's Applied Physics Division, which handles nuclear weapon design and assessment, weapon performance code development, and weapon science support.

He returned to Sandia in 2006 as vice president of the Labs' California operation, then became executive vice president and deputy director for the Nuclear Weapons Program in 2009. He became Sandia president and laboratories director in 2010. Three years later, the Federal Laboratory Consortium named him the Laboratory Director of the Year for his support of Sandia's technology transfer activities.



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THERE WILL BE A NEW VESSEL on the waters of San Francisco Bay when a cooperative research and development agreement between Sandia and the Red and White Fleet to design, build, and operate a high-speed hydrogen fuel cell passenger ferry and hydrogen refueling station comes to fruition. (Photo by Randy Montoya)

## Red, White, & Green

(Continued from page 1)

refueling station, pending the results of a feasibility study.

Hydrogen fuel cells have several advantages over the diesel engines that power most passenger ferries — no harmful exhaust emissions, higher energy efficiency, quiet operation, and no risk of fuel spills. Replacing diesel engines and generators with hydrogen fuel cells could greatly improve air and water quality in harbor areas.

The hydrogen refueling station is planned to be the largest in the world and serve fuel cell electric cars, buses, and fleet vehicles in addition to the ferry and other maritime vehicles.

The US Department of Transportation's Maritime Administration is funding the feasibility study to examine the technical, regulatory, and economic aspects of the project.

"The Maritime Administration is committed to finding new and efficient technologies for use in the maritime industry that reduce pollution and protect our environment," says Maritime Administrator Paul "Chip" Jaenichen. "This industry continues moving forward on renewable energy and clean-fuel options, and this project encourages a shift toward lower-impact maritime fuels that may further green the waterborne link in our national transportation system."

Sandia is leading the study in partnership with Red and White Fleet, the American Bureau of Shipping, the US Coast Guard, and naval architect Elliott Bay Design Group. Other contributors include the California Environmental Protection Agency's Air Resources Board and the Governor's Office of Business and Economic Development.

"We are involving so many stakeholders up front because if the feasibility study shows a 'go' we want to make sure the next phase has a rock-solid foundation," says mechanical engineer Joe Pratt (8367), the Sandia project lead. "We hope the feasibility study, regardless of the outcome, can be useful to others nationally and around the world who are looking at hydrogen fuel cell vessels as clean energy alternatives."

### Boat speed critical to economic viability

Economic viability is essential to the success of SF-BREEZE. "Rather than a tour boat that would primarily be a demonstration project, Red and White Fleet believes a high-speed passenger ferry makes economic sense," says Joe. To compete with existing transportation methods — cars, buses, Bay Area Rapid Transit, and other ferries — the ferry must be fast. But speed adds complexity.

"If you are trying to achieve speed, boat weight is important," Joe says. "Fuel cells and hydrogen are heavier than existing diesel engines and fuel, so the question becomes can you build a boat powered by hydrogen fuel cells that is both large and fast enough? The feasibility study will provide that answer."



A preliminary conceptual study shows the answer is probably yes, but it will require a boat specially designed to accommodate hydrogen fuel and the fuel cell technology. A traditional passenger ferry can't easily be retrofitted with a hydrogen fuel cell, so it was essential to include a naval architect in the feasibility study. The ferry design will include collaboration with the American Bureau of Shipping and the Coast Guard to ensure the final design conforms to safety and reliability rules and regulations.

### World's largest hydrogen refueling station

The boat — design, operation, maintenance, and fueling — is one part of the equation; the hydrogen refueling station is the other. The high-speed passenger ferry would use about 1,000 kilograms of hydrogen per day. To put this in perspective, an average hydrogen fuel cell car might use less than 5 kilograms of hydrogen per week.

To support the ferry and other potential users, the refueling station would have a capacity of 1,500 kilograms a day — about twice the size of the largest hydrogen refueling station in the world. It would also be the first hydrogen refueling station to simultaneously serve land and marine uses.

The economy of scale could boost the local hydrogen fuel cell marketplace. "A larger station reduces the cost per kilogram of hydrogen," says Joe. "Higher use will drive down that cost even more."

Reducing the cost of hydrogen refueling could stimulate the market for hydrogen fuel cell cars and accelerate wider adoption of the technology in other vehicle markets, such as heavy-duty trucks and buses.

"This project offers an opportunity to closely examine how hydrogen can take its rightful place as a clean, low-carbon fuel for high-volume transportation operations, and also build the business case as part of an innovative application for fuel cells," says Catherine Dunwoody, chief of the Fuel Cell Program at the California Air Resources Board.

### Feasibility study will address regulations

SF-BREEZE will enter new regulatory space, both for the high-speed ferry and refueling station. The feasibility study will examine those regulations and their impact on the project.

For the refueling station, Sandia can draw on its technical expertise in developing and optimizing safe, cost-effective vehicular hydrogen fueling stations. DOE's Fuel Cell Tech-

nologies Office funds most of Sandia's efforts in this area. Sandia is a leading partner in two nationwide infrastructure initiatives: H<sub>2</sub>USA, a private-public partnership focused on advancing hydrogen infrastructure, and the Hydrogen Fueling Infrastructure Research and Station Technology (H<sub>2</sub>FIRST), a DOE project established to support H<sub>2</sub>USA.

"The knowledge, tools, and stakeholder resources we've cultivated through these initiatives will directly apply to developing the large, multi-use hydrogen refueling station," says Joe. "We will work closely with the Air Resources Board and the California Governor's Office of Business and Economic Development to determine the best location for the refueling station and understand the associated regulations."

Sandia leads the Maritime Fuel Cell project, which is piloting the use of a hydrogen fuel cell to power refrigerated containers on land and on transport barges at the Port of Honolulu.

"Working with the Bureau of Shipping and the Coast Guard, we've explored some of the unique issues related to using a hydrogen fuel cell on a vessel and in the marine environment," says Joe. "But there is more at stake when the fuel cell is powering the boat, not an auxiliary system, and the boat is carrying passengers."

### Vessel design next step

If the feasibility study indicates that SF-BREEZE could succeed technically, economically, and within regulations, the next step is to design the vessel. The project will need additional funding, resources, and partners, which could come from the federal government, the state of California, investors, industry, or private foundations.

Escher jokes that if the project ultimately succeeds, it could hurt him financially.

"It will make all of my boats obsolete and I'll have to replace my entire fleet," he says. "But in all seriousness, this is really about preserving the environment for future generations."

He hopes to continue Red and White's tradition of leadership and environmental stewardship established by his grandfather Thomas Crowley, who started the company in 1892.

"I want to ride across the San Francisco Bay on a quiet, fast boat with no emissions," he says. "If we get thirsty, we can drink the exhaust." Visit [maritime.sandia.gov](http://maritime.sandia.gov) for more information.

## Hydrogen fuel cell project seeks to reduce port emissions



RUSLAN KOSYAN, Hydrogenics project engineer, right, shows Joe Pratt, Sandia project manager, the hydrogen storage system within the fuel cell unit. (Photo courtesy of Hydrogenics Corp.)

### Young Brothers Ltd. to test maritime unit at Port of Honolulu

By Patti Koning

**C**an clean, sustainable hydrogen power reduce the concentration of emissions produced at commercial ports? DOE, the US Department of Transportation's Maritime Administration (MARAD), and Sandia are leading a hydrogen fuel cell deployment project in Hawaii to answer that question.

The project will test the feasibility of replacing diesel gen-

erators with hydrogen-fuel-cell-powered generators. Because hydrogen fuel cells produce zero pollutant emissions and no greenhouse gases at the point of use, this technology could enable major commercial ports and marine vessels to lessen their environmental impacts.

"This effort will provide critical information about the commercial viability of hydrogen fuel cell technology in maritime environments," says Joe Pratt (8367), the project lead for Sandia. "This project is a stepping stone for widespread use."

#### Unit passes factory acceptance testing

The hydrogen fuel cell generator unit consists of four 30-kilowatt fuel cells, a hydrogen storage system, and power-conversion equipment packaged in a 20-foot shipping container. Designed and built by Hydrogenics Corp., the unit

passed factory acceptance testing in June at the Hydrogenics Canada facility in Mississauga, Ontario.

"The factory acceptance test demonstrated that all systems have met our quality standards. We are confident in the unit's ability to meet the demands of this unique deployment.

Hydrogen fuel cells are fairly common, but not in maritime environments," says Hydrogenics project manager Nader Zaag. "Hydrogenics is providing an innovative solution by applying fuel cell technology to an emerging market."

Sandia and Hydrogenics recently delivered the unit to Young Brothers Limited's Port of Honolulu for the project's deployment phase in Hawaii. Young Brothers, a subsidiary of Foss Maritime Co., is Hawaii's leading interisland freight and transportation company, delivering cargo among all major Hawaiian Islands.

"We are proud to be the first host in the country for this unit and are looking forward to demonstrating this hydrogen fuel cell technology," says Young Brothers President Glenn Hong. "Environmental stewardship is a core value at Young Brothers, and we strongly support clean-energy initiatives such as this project."

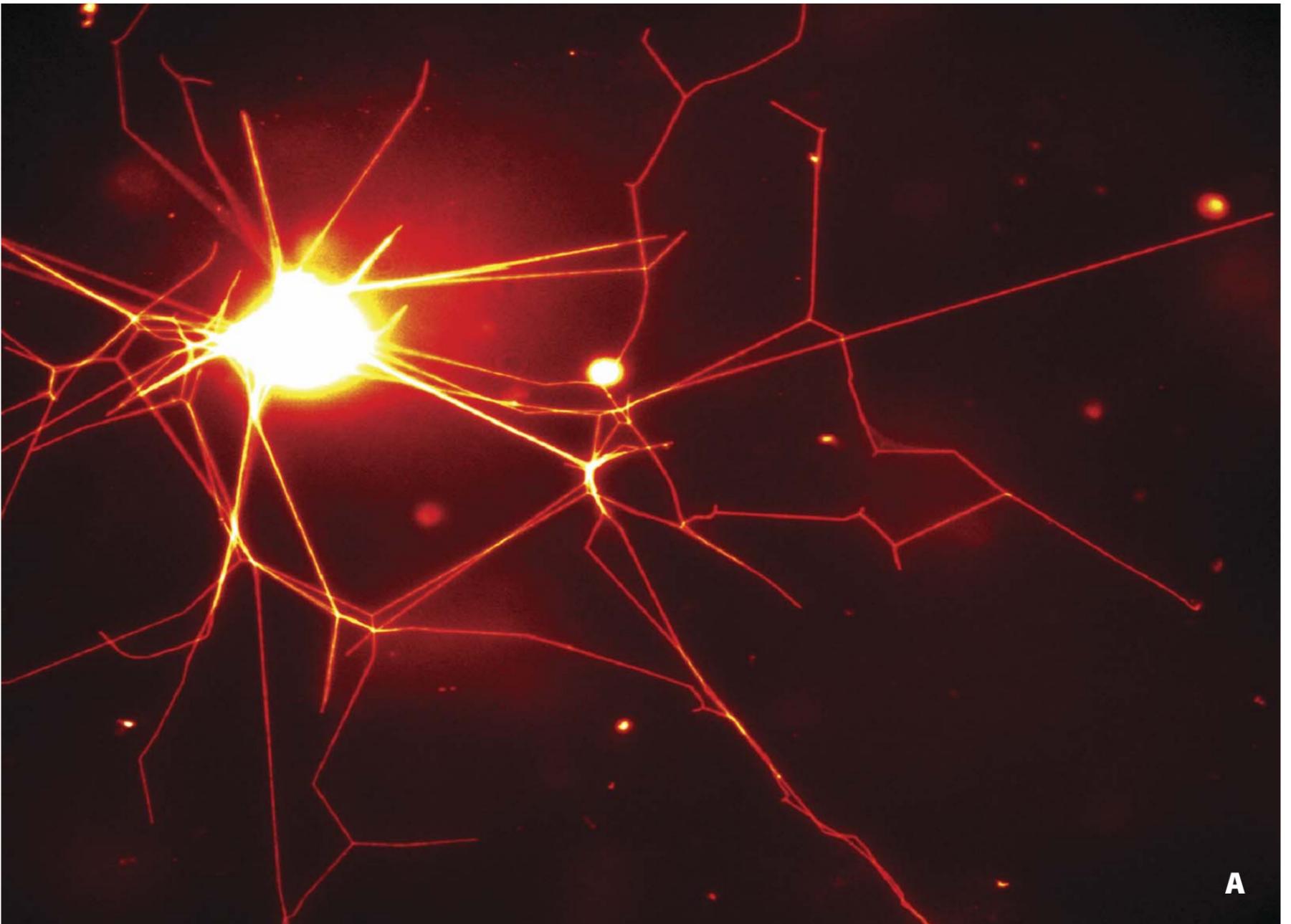
Young Brothers will first deploy the prototype onshore at its Port of Honolulu; later, the unit will be used on an interisland transport barge. In both cases, the fuel-cell unit will provide power so that refrigerated containers can keep their perishable contents cold throughout the journey. In preparation for the unit's arrival and deployment, Pacific Northwest National Laboratory provided hydrogen-familiarity and first-responder training to more than 200 first responders, Young Brothers personnel, and other local stakeholders.

Other partners include the Hawaii Natural Energy Institute, the Hawaii Center for Advanced Transportation Technologies, the US Coast Guard and its local Sector Honolulu office, the Hydrogen Safety Review Panel, and the American Bureau of Shipping.

This hydrogen fuel cell deployment project, which is cofunded by DOE's Office of Energy Efficiency and Renewable Energy and MARAD's Office of Environment and Compliance, is an example of innovative market transformation efforts underway to demonstrate early markets for cutting-edge, clean-energy technologies.



THE MARITIME FUEL CELL PROJECT is testing the feasibility of replacing diesel generators with hydrogen-fuel-cell-powered generators at Young Brothers' Port of Honolulu. (Photo courtesy of Hydrogenics Corp.)



## Biological tools create nerve-like polymer networks

### Crowdsurfing motor proteins start the process

By Neal Singer

Using a succession of biological mechanisms, Sandia researchers have created linkages of polymer nanotubes that resemble the structure of a nerve, with many outthrust filaments poised to gather or send electrical impulses.

“This is the first demonstration of biomolecular machines assembling complex polymer structures,” says George Bachand (1132).

Creation of the neural structure, unachievable by normal manufacturing techniques, begins by altering the behavior of kinesin motor proteins — biological machines found in every human cell. These tiny motors, portrayed in video-graphics as a vertical body with two legs, tote cellular matter as they stride along protein microtubules that form the cell structure. In their purposefulness, the motors resemble the enchanted brooms in Disney’s *Fantasia*, relentlessly carrying buckets of water up the castle stairs.

Turning nature’s machinery on its head, the researchers used known techniques to glue the “shoulders” of kinesin

Photos show fluorescence microscopy images of polymer and nanotube networks created by biological nanomotors. Images A and B show only polymer nanotubes (red); C shows polymer nanotubes and green protein microtubules. Because the polymer microspheres absorb more fluorescent dye than the nanotubes, they are brighter. Each center “node” of the networks is about 20 microns in diameter, and some of the tubes are longer than 100 microns.

motors to a glass substrate. This prevents their bodies from traveling, but their “legs” above them continue their vigorous movements. These pass microtubules above them like an audience crowdsurfing entertainers on upraised hands.

In the next laboratory step, these traveling protein microtubules, microns in length, encounter relatively large polymer spheres, tens of microns in diameter, inserted by the researchers.

“At that point, we have structures that want to do work — the kinesin-powered microtubules — and something they want to do work on — the spheres,” says co-primary investigator Wally Paxton (1132).

The microtubules, pre-coated with a sticky substance, pinch off polymer nanotubes from the polymer ball that lengthen as the kinesin motors travel on. The process resembles strands of string cheese lengthening as a piece of pizza is removed from a pan, says Wally.

As the nanotubes lengthen and crosslink, they form structures complex enough to bring to mind the lights of a city seen at night from an airplane at high altitude. The networks range from hundreds of micrometers to tens of millimeters in total size and are composed of tubes 30 to 50 nanometers in diameter.

“One goal of our work is to make artificial, highly branched neural structures,” says George. “The next step is, can we wire them together? The answer is, the motors should do it naturally. And two such networks, joined together, would have self-healing built into them. The

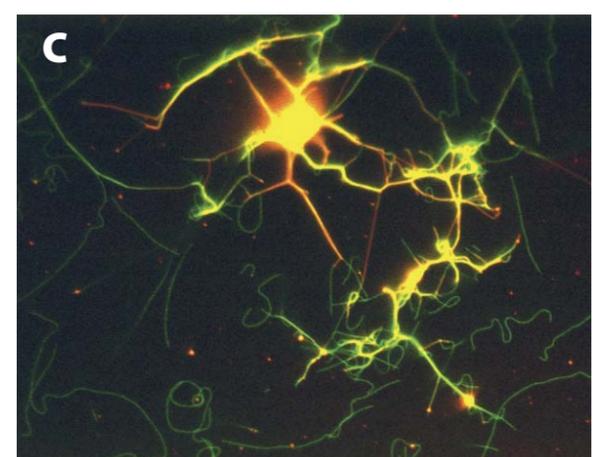
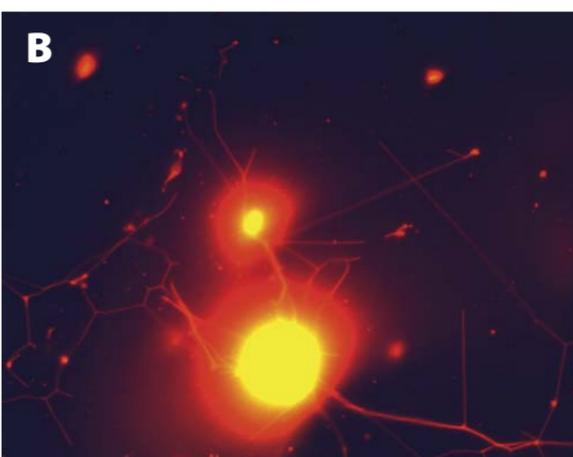
motors never stop running until they run out of fuel. A neural branch breaks, and then a motor can act on that area to produce a new branch.”

“This is foundational science,” says Wally. “It’s the first time a chemically created network has been arranged by biological means without going through the macrostage of normal manufacture. Now we have a robust artificial network that could communicate with an artificial limb as a prosthetic interface. Currently, we use hard rigid electrodes to penetrate nerve tissue; they cause inflammation. One possibility we see is to use soft structure like those created here to painlessly interface with the body’s nerve structures.”

The insertion of quantum dots also proved stable, which means that light could be used to carry information through the structure as well as electricity.

A paper on the work was published in April in the journal *Nanoscale*. Other authors were Nathan Bouxsein, Ian Henderson (both 1132), and Andrew Gomez (1815).

The work is supported by DOE’s Office of Basic Energy Sciences and performed in part at its Center for Integrated Nanotechnologies, an Office of Science user facility.



# A learning experience

## Student interns have fun while gaining valuable skills

By Valerie Larkin

Summer means family vacations and long, warm days. At Sandia, it means the campuses are bustling with energetic young researchers and business-people who have come to the Labs looking to make a difference, gain work experience, and learn about future career opportunities with Sandia.

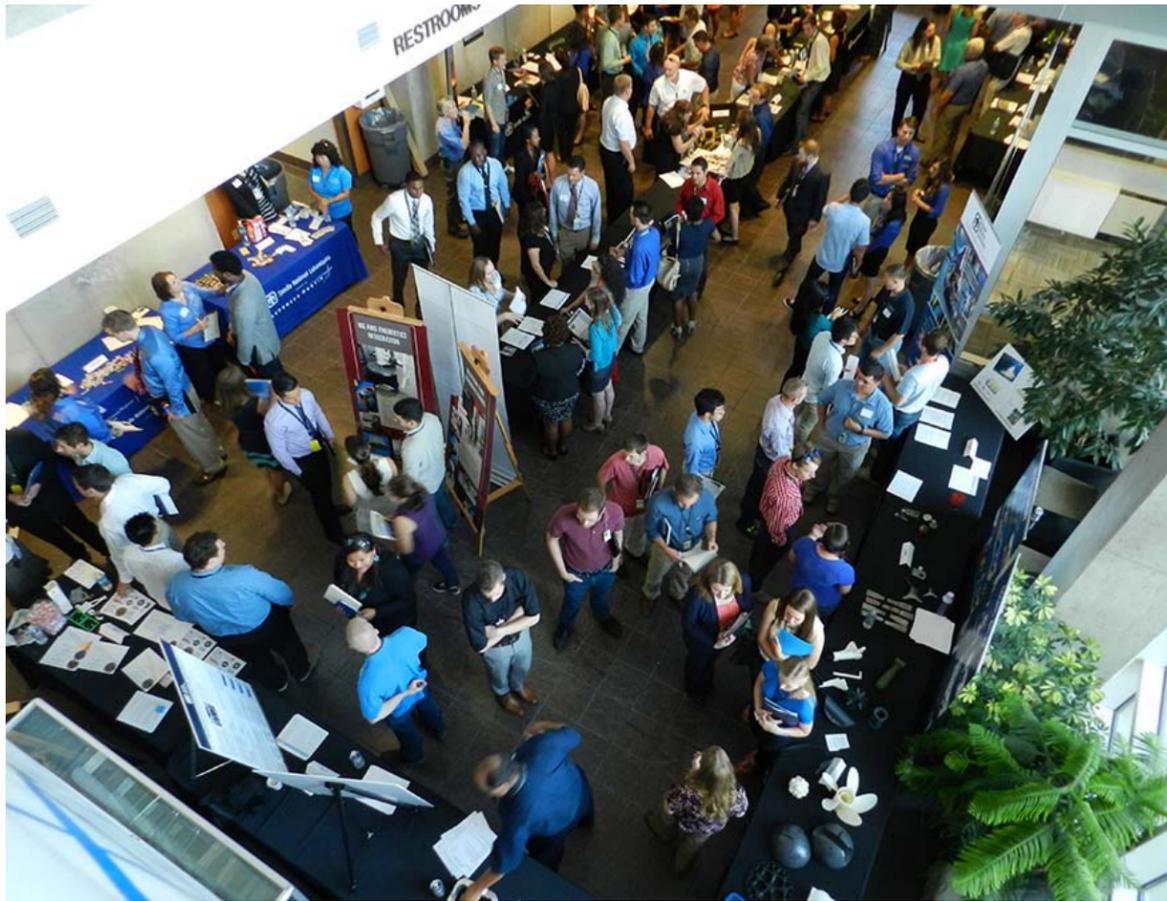
Interns come to Sandia from all over the country, representing more than 160 schools. The interns at Sandia's New Mexico and California sites number approximately 1,100 this year, with about half having joined the Labs for the warmer months. The rest work year-round while attending colleges and universities in the Albuquerque and Livermore areas. Sandia even has a couple of dozen high school interns on-roll. Interns support every division, performing a range of technical, business, and clerical work.

"Sandia internships are designed to give students practical and meaningful work experience, an opportunity to grow their skill sets and networks, and in turn create a valuable talent pipeline for Sandia's full-time employment," says Margaret Quinn, manager of Employment, Staffing, and Recruiting (3555). "Through a series of events in the summer, we create prime opportunities for hiring managers to meet and connect with a significant population of incredible talent from top campuses across the nation."

### A summer full of activities

Summer is a busy time for interns. In addition to project work and meetings with their mentors, interns stay engaged with activities such as lectures and workshops, social gatherings, and community service projects offered at both sites.

Interns' summer work culminates in the symposia held at the end of July at both sites. The symposia give the students an opportunity to showcase their projects and accomplishments to fellow interns, Sandia employees, and hiring managers in a lively poster presentation. This year, the California Intern Symposium had record turnout, with 120 interns pre-



NEW THIS YEAR — Recruiting and Student Programs organized a career fair in the Building 858EL lobby to give students a chance to discuss their skills and interests with hiring managers and learn about Sandia career opportunities. (Photo by Danielle Martinez)

sented their work.

Ellen Voegtli (5545), who participated in the New Mexico symposium last year, said, "Creating a poster for the project I was presenting was a good experience for me because I hadn't done that in a professional setting before. The process of summarizing in a manner that could be presented to the public was really good for me because it encapsulated everything that I worked on and made me realize the scope of the work I'd done."

### Meaningful work, not busywork

As a computer science student at the University of Southern California, Ellen was looking for an intellectual challenge, and she chose Sandia for her first internship. She spent the summer after her junior year working on an image-processing project.

"Engaging with my mentor and my manager, and also working in the building with about 40 other interns, it was an amazing experience," she says.

As her internship was nearing its end, Ellen demonstrated to her customers a tool she had optimized. The knowledge that her work would be useful to others was particularly rewarding. "For

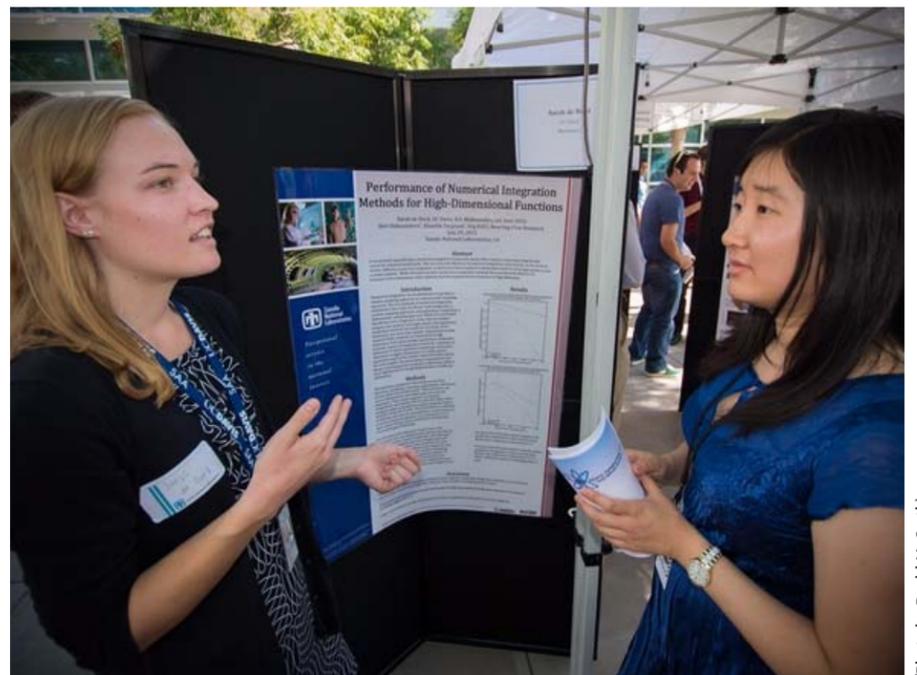
me, that was the epitome of the summer. I was really happy that I could contribute so meaningfully to the company," she says.

Ellen's internship introduced her to advanced concepts in her field, and convinced her to pursue a master's degree. "I realized there were areas of computer science I wanted to delve into, and I'm excited to be able to take an extra year or two to explore the more specialized areas of the field," she adds. Ellen was recruited for a regular position as a participant in Sandia's Critical Skills Master's Program. This fall she will begin a master's degree in computer science and engineering at the University of Michigan and will return to Labs when her degree is completed.

Ruth Herrera Reed (8253), a PhD student in mechanical engineering at the University of California, Berkeley, is a summer intern at the California site. This summer she is working on a heat transfer project, and after graduation she hopes to work full-time at a national laboratory.



(Photo by Danielle Martinez)



(Photo by David McGrath)

THE ANNUAL STUDENT INTERN SYMPOSIA draw students from across the Laboratories who are excited to present their summer projects to fellow interns, hiring managers, and Sandia employees. Students from New Mexico (left photo) and California (right photo) impressed attendees with the quality and scope of their work. This year's symposium at the California site had a record turnout.



ARMIDA CARBAJAL (415) a PhD statistics candidate at the University of New Mexico, has been a year-round Sandia intern since 2002. Of her experiences at Sandia, Armida says, "It's helped to motivate me because there are so many amazing, inspiring people here." (Photo by Randy Montoya)

"I've learned so many new things working on this project, including exciting theories and mechanisms. The environment is collaborative and research-intensive, and I can apply my skills here. It has helped broaden my knowledge," she says.

Tally Lobato, Student Programs hiring specialist (35552), says, "Our internships are not just great learning opportunities; they also provide a taste of working for a national security laboratory and all that it entails. We like to attract and expose interns to this type of work in hopes of creating interest in Sandia's overall mission."

#### Intern as mentor

Armida Carbajal (415) was studying biology at the University of New Mexico as an undergraduate when she heard about Sandia from a friend. That was in 2002, and she has interned year-round at Sandia ever since. She has supported a number of departments and projects such as radiation protection and dosimetry, behavior-based safety, the neutron generator, and Tracer FIRE, a training exercise for cyber incident responders. Now pursuing a PhD in statistics, Armida says her internship experience has evolved as her education has progressed.

"My roles and responsibilities as an intern have grown throughout my education. I grew up and matured here. Sandia has had an effect on my career goals, and it's all positive. It's helped to motivate me because there are so many amazing, inspiring people here," Armida says.

As a seasoned member of the intern community, Armida shares the benefits of her experiences by mentoring other interns. Speaking to the intern community, Armida says, "Reach out; do your own outreach. Someone helped you be where you are today. Go help someone else too, even though you're an intern. Just because you're not a full-time employee doesn't mean you can't participate in outreach."

# Building community

**TAKING TIME TO GIVE BACK** — Student interns dedicated a Saturday in June to help build Sandia's Habitat for Humanity house in Albuquerque. Students in California volunteered at an animal adoption event. (Photo by Randy Montoya)



# With STARS in their eyes

By Rebecca Brock

Performing real scientific research with professional mentors at Sandia was a dream come true for high school students like Maddison Casillas, a senior at Los Lunas High School.

“I want to be a researcher when I am older, and because of the STAR Program, I am in a lab doing the real work that I will hopefully one day have a job doing.”

Maddison and fellow high school senior Thao Nguyen were paired with Sandia chemist Bernadette “Bernie” Hernandez-Sanchez (1815) in the Advanced Materials Lab (AML) during their eight weeks in the STAR Fellowship. “We get to help the scientists with the projects they are working on, which feels more relevant to the real world than the work we do every day in our high school labs,” Thao says.

Sandia and Lockheed Martin’s STAR Fellowship Program allows local high school students who are excited about science, technology, engineering, and math (STEM) careers the opportunity to have an educational experience with guidance from Sandia’s engineers or scientists. Over the course of eight weeks, the students prepare for an end-of-summer presentation where they gain skills in public speaking and share with their peers what they have learned.

Now in its 13th year, STAR encourages young people who are entering their last year of high school to pursue careers in STEM after graduation. Local public and charter high schools in the greater Albuquerque community can nominate up to two students each year. While the students come from diverse backgrounds, they are all typically at the top of their class and have been nominated by their math and science teachers.

## A select few

Alice Muna (6231), a member Sandia’s STAR selection committee, says the application process is highly competitive. “We look for students who are serious about becoming engineers and scientists,” she says. “This enthusiasm is shown through their grades, letters of recommendation, extracurricular activities, and their personal essay. As these students witness the type of work engineers and scientists perform, they become better informed to make decisions in college



THE SITUATION WELL IN HAND — Students Isabella Stork, Justice Montoya, and Selena Tran Juardo handle chemicals in a glove chamber at the Advanced Materials Laboratory. (Photo by Randy Montoya)

and hopefully pursue this type of career.”

Alice, a fire protection engineer in Risk and Reliability Analysis and an Albuquerque native, was a STAR student back in 2004. “The STAR Program was my foot in the door, because I didn’t know anyone at Sandia. It gave me an opportunity to make contacts and to build my resume. It’s a really good program for high school students who need a way in.”

The STAR program is beneficial not only to local students but also to the Sandia scientists and engineers who mentor them. The program is an eight-week commitment for Sandia mentors interested in working with young people in their work environment.

## The making of a mentor

Sandia’s STAR mentors are represented in organizations across the Labs. Bernie Hernandez has been a mentor in the STAR Program since 2009. “Within eight weeks we are training them in safety, how to work in a chemistry laboratory, and how to run and characterize a reaction,” she says. Safety training is a key component in the AML where the STAR students receive a full week of

paper training, followed by a buddy system where they are paired up with staff and experienced student interns.

“The thing that surprised me the most about the STAR students is that when given the chance and shown how to do something, these high school students are operating and performing like undergrads,” Bernie says.

Maddison and Thao describe Bernie as a detailed and patient mentor. “When you ask a question she is never going to blow it off. She will explain it until you get it.”

Bernie says the reason she became a STAR mentor is because when she was a student at Rio Grande High School, she had the opportunity to work with Tim Boyle (1815) at the AML. Tim proved to be a great mentor to her. “I knew the impact it made on me in terms of helping me,” she says.

Tim has been a STAR mentor since the inception of the program in 2001. This summer he mentored two Albuquerque high school students, Selena Tran Juardo and Justice Montoya.

Tim says, “The STAR students bring energy to the Labs. That is why we work with students. We bring them in for the summer and we kind of evaluate them as they evaluate us. Some of the students are invited to participate in the AML Student Program, which allows them to continue their educational experience.”

When it comes to training students, Tim says he looks at it like a long-term investment. “Bernie was a high school student who I mentored, and that was an investment that paid off.”

The STAR program is administered by Cheryl Garcia (3652) and Sandia’s Community Involvement Team.



STAR STUDENTS Thao Nguyen (left) and Maddison Casillas (right) spent eight weeks performing scientific research in the Advanced Materials Laboratory. (Photo by Randy Montoya)

## Lockheed Martin scholarship winners

Fifteen high school seniors who are the children of Sandians are among 100 students to win Lockheed Martin Foundation scholarships in the 2015 National Merit Scholarship program. The scholarships are awarded to qualifying National Merit Finalists and to students who scored extremely well on the PSAT/National Merit Scholarship Qualifying Test but did not become finalists in their states. The winners are academically within the top one-half of 1 percent of all US high school graduates.

The children of current full-time and part-time employees of Lockheed Martin and its subsidiaries can compete for the scholarships. To be considered, high school students must take the Preliminary SAT/National Merit Scholarship Qualifying Test (PSAT/NMSQT) in the fall of their junior year and submit an application and essay to the Lockheed Martin Foundation. Of the 1.4 million students who take the PSAT each year, about 16,000 are named semifinalists.

The scholarship awards \$3,000 a year for up to four years of undergraduate study. A National Merit Scholarship Corp. (NMSC) committee chooses the recipients by evaluating several academic and extracurricular factors about each candidate.

The National Merit Lockheed Martin Academic Scholarship Program is an annual competition conducted by the NMSC, an independent, not-for-profit organization. For more information on the scholarship, visit the Community Involvement website at <http://community.sandia.gov/employee-focused-programs/>.

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The 2015 Sandia scholarship recipients and their parents are:

### National Merit Lockheed Martin Academic Scholarship

- Suzanne E. White — Caryn E. White (9517) and John E. White (5422)

- Abigail L. Reeves — Paul C. Reeves (5545)
- Justin H. Porter — James D. Porter (5792) and Vicki Porter (1542)
- Serena T. Fang — Lu Fang (1718)
- Megan J. Culler — Teresa M. Jordan-Culler (5422)
- Ivan R. Aidun — Joan M. Harris (415) and John Aidun (1425)

### Lockheed Martin Academic Scholarship

- Patrick V. Burgess — Patrick W. Burgess (1446)
- Elise L. Eras — Kenneth Eras (2136)
- Alyssa G. Yocky — David A. Yocky (5962)
- Julia Friedmann — Thomas A. Friedmann (1745)
- Jared M. Staten — Matthew L. Staten (1543)
- Miranda A. Rintoul — Mark D. Rintoul (1462)
- Emilie S. Reese — Garth M. Reese (1542)
- Samantha Montoya — Dominic A. Montoya (2241)
- Sally J. Jensen — Richard P. Jensen (6914)

# Role models in STEM

## 11 Sandians nominated for prestigious HENAAC awards



(Photo by Randy Montoya)

Eleven Sandians were recommended by their managers for Hispanic Engineer National Achievement Awards (HENAAC), and two of them were selected to be the Labs' official nominees. The prestigious awards program in its 27th year honors the nation's best and brightest Hispanic engineering, science, and technology experts. Nominees from around the country will be evaluated by Great

Minds in STEM, which coordinates the annual HENAAC awards and conference. Sandia's potential nominees were recognized at a July 29 event. Div. 10000 VP and Chief Financial Officer Bonnie Apodaca told the group there are two key reasons HENAAC is important. One is that great Sandians are recognized nationally. "Their hard work is known and they become role models," said Bonnie, who is



executive champion for the Hispanic Leadership Outreach Committee. And, secondly, she said HENAAC introduces Sandia to top-notch university recruits. "It's a great way to get our name out there and attract the best students," she said. The Sandians recommended this year for HENAAC awards include, clockwise from top of the photo, Austin Ray Silva (1463), Patrick Sena (2200), Pablo Garcia (6830), Martin Sandoval (6815), Theresa Cordova (1521), Abraham Ellis (6112), Oscar Negrete (8621), and Vincent Urias (9526). Not pictured are Daniel Gonzales (5796), Luiz Paz (256), and Marcos Sanchez (1753). Abraham and Patrick were chosen to move forward in the awards program. Thirty-two Sandians have received HENAAC awards in the past 19 years. Jaime Moya, Center 4100 director and a HENAAC winner, said at the event that Sandia has "always been competitive in a very competitive process." He said the internal nominations create role models in the Hispanic community.

— Nancy Salem

## Sandia hosts Albuquerque visit of DOE's tribal energy program director



(Photos by Randy Montoya)

On July 27 at Albuquerque's Indian Pueblo Cultural Center, Sandia hosted the DOE Office of Indian Energy forum on tribal utility formation and energy development. Sandia researcher and member of the Navajo Nation Sandra Begay-Campbell (6124) says the event was critical for tribal leaders to explore relevant options for improving energy development and utility service distribution to their tribal members.

In the photo above new DOE Office of Indian Energy Director Christopher Clark-Deschene welcomes tribal leaders and staff from across the US to the forum. In a panel on current and emerging tribal energy policy and programs, Clark-Deschene remarked that "a balanced build-out approach within the jurisdiction of the tribal leaders" is the way forward for energy development on tribal lands.

In the photo at right, Sandra introduces her student interns, the next generation of advocates for renewable energy in tribal communities, to Clark-Deschene. Seen here with Sandra, third from left, and Clark-Deschene, center, are, from left, Tommy Jones, Kimberlynn Cameron, JoDonna John, Brittany Anstead, and Len Necefer.



DOE'S TRIBAL ENERGY PROGRAM'S MISSION is to provide financial and technical assistance to tribes through government-to-government partnerships that:

- Enable tribal leaders to make informed decisions about energy choices
- Bring renewable energy and energy efficiency options to Indian Country
- Enhance human capacity through education and training
- Improve local tribal economies and the environment
- Make a difference in the quality of life of American Indians and Alaska Natives



## Employee deaths

# Pedro Heath remembered as a man of passion, heart, and humility

A quiet man who let his work do his talking, a man who loved music and was a champion of the underdog, Arthur Pedro Heath Jr. passed away at his home in Albuquerque on July 25. He was 42 years old. He began at Sandia in 1993 as an intern in the Science and Technology Alliance (S&TA) program and was hired on full-time in 1995.

Jody Smith, manager of Measurement Science & Engineering Dept. 1535, was Pedro's boss for the last five months of his life. She remembers Pedro as a self-contained man, almost shy, but with a passion for his work.

"He always lit up when we had discussions about being part of the maturation of our engineering document control," Jody recalls. "He was full of ideas and many of those are being incorporated. Over the last several months he was working on a very challenging electrical tester. The week before he died, he told me that he really liked the complexity and difficulty of the project and was having fun."

Todd Sterk (2955), who was Pedro's manager for four years, also noted the quiet side of Pedro's public demeanor, but says he could become extremely talkative in one-on-one discussions, especially about his work. "Pedro was extremely talented in many areas related to tester and tester design. He will be missed," Todd says.

### A problem-solver

Network Centric Security Systems Design Dept. 6523 Manager Ivory Alexander notes, "Pedro had a significant technical impact in Weapons & Force Protection Center 6500 in developing testing and validation capabilities for Electronic Security Systems (ESS). His efforts resulted in successful troubleshooting of system components that in some cases were causing system performance problems that were missed by traditional testing methods."

Pedro's love of engineering came early. His mother, Dorothy Heath, recalls, "As a toddler we noticed that Pedro



PEDRO HEATH

liked things that had motion — fan blades, motorized toys, and flying objects. He loved taking things apart to see what made them work. At the age of 5, he announced to us that he wanted to be an engineer. We lived near a railroad track and assumed he meant a railroad engineer. Very clearly he said, 'Not a railroad engineer, mama: an electrical engineer.' We asked him how he knew about electrical engineers, and he told us that he read about it. He never spoke of having any other career."

Pedro's mother describes him as a well-rounded child who jogged his first mile at age 5, got into weightlifting early, and participated in several high school sports and the high school marching band.

### 'A pinch of jazz'

"Another one of his great loves was music," she says. "At the tender age of 3, he would stand at a child-sized piano we had purchased for his older sister, Tonya, and tell her to sit on the piano stool and sing — and she did. He could also sing but did not like to sing publicly."

Pedro's mother is proud of what he accomplished in the workplace, but even prouder of him as a good and kind man. "He was smart, compassionate, and loved helping others," she says. "We felt so proud of the way he cared about people whom he considered to be the underdog in need of a defender. Even after he relocated to Albuquerque, he provided financial assistance to help support the homeless and he set up a scholarship for a young student desiring to become an engineer."

Belinda Holley (3521), who has known Pedro since he first came to Albuquerque, experienced his love of music firsthand. "Pedro was a gifted musician with passion, heart, and humility," she says. "He played piano for my church choir when we were without a permanent musician. We were very pleased to have him. One of his many gifts was the ability to add a pinch of jazz to a traditional black gospel song and make it come alive with much vitality and joyfulness. We enjoyed fellowshiping with him. He will be missed."

Brian Carpenter (1535) only worked with Pedro for a few months but enjoyed getting to know him and to experience a bit of Pedro's understated humor. "Pedro was always courteous and nice to me. I never heard him complain, even



ARTHUR PEDRO HEATH JR. as a student intern at Sandia in 1993.

when his office lights didn't work for quite some time. One day when we were trying to troubleshoot a difficult problem, I said to him 'I should have been a farmer.' He replied, 'Oh no; that's too much work!'"

Jeffrey Robinson was a roommate with Pedro in 1993 when both were part of the ST&A program. "I remember him always being very respectful and courteous to his fellow apartment mates. I also remembered him being a devoted Christian who made it a priority to not only attend church faithfully, but participate in the music ministry as a pianist."

Friend and colleague Tony King (1535) considers it a privilege to have known Pedro. "He was a talented engineer, a critical thinker, and a hard worker. We spent so much time together, we might as well have shared the same office. Although Pedro was only in our department for five months, his contributions were essential to our success. Our work was pretty intense, so it always gave me a great sense of joy and satisfaction when we could share moments of laughter. It's those moments that I will miss the most."

Pedro, who was engaged to be married, is survived by many relatives, including his father, Arthur Pedro Heath Sr., and mother, Dorothy Horne Heath of Goldsboro, North Carolina; sister Tonya McNair and her husband Lamont; brother Brian Charles Lane; and maternal grandfather Jasper Horne. — Bill Murphy

# George Sartor lived with the wind at his back

On July 16, George Bernard Sartor died in a bicycle accident at the age of 54. He is survived by his five children, two brothers, three sisters, parents, and many nieces, nephews, uncles, aunts, and cousins.

George was born in Nuremberg, Germany, and grew up in Texas. His life centered on raising his five children, competitive cycling, and his career as a mechanical technologist. He spent his entire Sandia career in Livermore, except for three years (1995-1997) in Albuquerque.

"George Sartor was a skilled principle technologist known across the laboratory for his friendly demeanor, candid sense of humor, and as a person who deeply cared for others," says Russ Miller (8200), director of the California Weapons Systems Engineering center.

In his 27-year career at Sandia, George made substantial contributions on multiple fronts, from hydrogen storage to his role in the Metal Hydride Center of Excellence to his recent development of a mission-critical, high-vacuum, high-temperature mechanical test capability.

"George had a passion for continuous improvement, and strived to find efficiencies in the test operations he worked on," adds Russ. "He brought a constructive, proactive attitude to every task of every project."

Joanne Volponi (8633) first met George in 1988 when he interviewed for a position at Sandia's Combustion Research Facility (CRF). "We thought he would be a great addition to the CRF because of his education at Texas State Technical College, previous job experience at the Naval Research Lab, knowledge of laser systems, and mechanical skills," she recalls.

"Everyone liked George. He had a unique sense of humor, liked to tease, and told it like it was. He was very skilled at conceptualizing, machining, and assembling parts needed for experimentation. For those of us who saw him on Thursday, July 16, we never imagined it would be for the last time."



GEORGE BERNARD SARTOR

Jim Brennan and Dan Throckmorton (both 8625) started at Sandia as interns in the same building as George. Even though he was in a different department, George took the two young men under his wing. This was the start of a lasting friendship that included many weekends camping and cycling together.

"George had so much experience and knew everyone, it seemed," says Jim. "If I came to him with a problem, he'd stop what he was doing and figure it out. He wouldn't just tell you who to talk to, he'd make the phone call or walk you over to that person's office to make the introduction."

"If you called him, he'd come," recalls Dan. "Once, my car battery died while my wife was out of town. I immediately thought of George and of course, he came right away to help. He was that kind of guy."

### 'The coup of the century'

About four years ago, George joined the Mechanics of Materials department. "When George joined our group, I felt like we'd pulled off the coup of the century," says Bonnie Antoun (8256), one of his coworkers in that group. "He was very good at solving difficult technical problems. We felt like no problem was too big with George on our team."

George spent nearly every lunch hour riding with the Cycletrons, a group of competitive cyclists out of Lawrence Livermore National Laboratory. He also biked 20 hilly miles to and from work most days. He was an active member of the Central Valley Velo Cycling Club and Valley Spokesman Bicycle Club. George racked up numerous cycling awards over the years

including the California Triple Crown in 2014, an award for completing five double-century rides (200 miles) within a year. George did a sixth double-century ride just for good measure.

This was how Jim Lund (8130) knew George. "I began running into George daily in the locker room as I was getting

back into cycling. He talked me into riding again with the Cycletrons and taught me how to survive those intense daily rides," says Jim.

"Later, he encouraged me to start racing again. George effectively became my cycling coach and mentor. He observed my actions on Cycletrons rides and in races and would tell me in no uncertain terms — and drenched with profanity in his Texan accent — what I had done right and wrong."

Doug Vrieling (8512) and George turned their shared love of cycling and competitive natures into a 25-year friendship. "George was just a different kind of guy. He was unpretentious and straightforward. He'd give people his opinion and he may have gotten into trouble for it, but you always knew where you stood with him," says Doug.

"George was always looking for ways to push himself, and he made me a better athlete because I always wanted to beat him. We rode on the same teams sometimes and other times competed against each other. He was like a brother to me."

Andy McIlroy (1900), another avid cyclist, recalls that George

was the first person he biked with at Sandia. "I rode with George for the next 23 years and enjoyed every ride," says Andy. "He shared entertaining stories, pushed everyone to perform better than we thought possible, and had an amazing stock of tools and know-how when things went wrong. George was full of life and a good friend. I miss him terribly."

"On the day that George died, we met in the locker room for the last time," Jim recalls. "We discussed that day's noon ride and our bike commutes — he commuted

east to Tracy and I commuted west to San Leandro. I commented to George that his commute was probably more dangerous than mine because of the car traffic on the side roads. He shrugged it off and commented that he at least had the wind at his back." — Patti Koning



GEORGE SARTOR was a competitive cyclist and active member of several bicycle clubs. He spent nearly every lunch hour riding with the Cycletrons.

## SANDIA CLASSIFIED ADS

### MISCELLANEOUS

WINE COOLER, Vinotemp 400E, 280 bottles, single door, lock, \$300. Schmitt, 856-1280.

STOVE, Jotul 380, 10-ft. exhaust vent, \$500; Craftsman Contractor 10-in. band saw, \$400. Trujillo, 344-1259.

SOFA, hide-a-bed, large, comfortable, couch is heavy, bring a truck, \$395 firm. Beckman, 450-1844.

CHRISTMAS TREE, 7-ft., fiber optic, \$45. Bobbe, 505-350-9544.

DOG HOUSE, 56" x 60" x 48"H, opening 17" x 28", on coasters, double-walled for insulation, you move, \$300. Larsen, 263-5053, ask for Howard.

BED W/MATTRESS, queen, mission-style, 2 night stands, bench & dresser w/mirror, \$1,200/set. Hidalgo, 250-5225.

MATTRESS SET, king size, Tempurpedic Cloud Supreme, w/matching foundation, \$1,500 OBO. Williams, 505-836-2117.

TREADMILL, Trimline 7600, 250 miles, excellent condition, \$450. Balsam, 899-0963.

ENTERTAINMENT CENTER, 3-pc., oak, units are backlit, drawer & shelves, excellent condition, call for photo, \$150. Iman, 856-6500.

AQUARIUM SETUP, 20-gal. high, all glass, fresh/salt, w/filter, heater, skimmer, lights, cover, \$160. Baldo, 505-274-6478.

RECLINER SOFA, La-Z-Boy, dark brown fabric, 84-in., like new condition, cost \$1,200 new, asking \$475. Kramer, 281-8516.

COWBOYS TICKETS, 2 seats, 8/27 Falcons, 11/1 Seahawks, 11/8 Eagles, 11/26 Panthers, \$300/pair. McCandless, 553-5281, ask for Suzanna.

DUAL ATV TRAILER, 14-in. tires, metal deck, 12-1/2' long, 2 built-in folding ramps, \$1,200. Pinsonneault, 505-884-9499.

HAWAII STREETLIGHT & FUSES, of the type blown by Starfish in 1962, free. Vittitoe, 299-9298.

PINE HURST SWING, seats 2, canopy, dark green, unassembled, \$120. Lewis, 323-7268.

KITCHEN TABLE SET, seats 4, glass top, metal frame, photos available, \$250 OBO. Montoya, 331-6459, call or text.

ALL-WEATHER CAR MATS, Infinity, for G35/G37 sedan, beige, 2 front, 2 back, spotless, \$70. Hall, 280-4344.

### TRANSPORTATION

'06 TOYOTA 4RUNNER LIMITED, 4WD, gray leather, JBL sound, galactic gray mica, 82K miles, \$15,500. Turner, 505-750-2383.

'05 MERCEDES-BENZ E55 AMG, 469-hp, V8, loaded, white/black, performance & luxury, 95K miles, \$21,000. Sedillo, 505-890-2698.

'03 SATURN L-200, rigged for towing, w/tow bar, chains cable, 97K miles, Lemitar, NM. Yingst, 575-835-0749.

'04 FORD EXPEDITION, Eddie Bauer, V8, seats 8, AWD, recently serviced, 180K miles, good condition, \$5,500. Mata, 505-620-9664.

'12 FORD EXPLORER LIMITED, loaded, all records, maintenance plan available, 1 owner, 58K miles, \$28,700. Fernandez, 238-4722.

'07 TOYOTA HIGHLANDER HYBRID LIMITED, AWD, leather, gold, 1 owner, clean, 136K miles, Carfax, \$13,399. Morales, 505-610-8300.

'07 MIATA MX-5, silver touring PRHT, 6-spd., fully loaded, new battery, garage-kept, 73K miles, \$11,500. Witt, 991-1878.

'86 FORD MUSTANG 5.0 GT, convertible, AT, 8-cyl., white, 124.5K miles, good condition, \$3,000. Vernon, 505-715-2084.

'09 FORD FUSION, silver, charcoal interior, 42K miles, great shape, retail \$12,000, asking \$9,995. Ahr, 903-0036.

### How to submit classified ads

**DEADLINE:** Friday noon before week of publication unless changed by holiday.  
**Submit by one of these methods:**  
 • EMAIL: Michelle Fleming (classads@sandia.gov)  
 • FAX: 844-0645  
 • MAIL: MS 1468 (Dept. 3651)  
 • INTERNAL WEB: On internal web homepage, click on News Center, then on Lab News link, and then on the very top of Lab News homepage "Submit a Classified Ad." If you have questions, call Michelle at 844-4902.  
**Because of space constraints, ads will be printed on a first-come basis.**

### Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

### REAL ESTATE

3-BDR. HOME, 2 baths, 1,500-sq. ft., Volterra subdivision, near Sandia, granite, tile, upgrades throughout, previous model home, MLS#845678, \$219,000. Montoya, 505-920-1144.

3+-BDR. HOME, gorgeous adobe, on 1 acre, tile floors, granite kitchen, barn/horse stalls, Corrales, MLS#843432, \$550,000. Babb, 505-228-5225.

3-BDR. HOME, 1-3/4 baths, 1,317-sq. ft., updated, modern, open floor plan, new metal roof, Indian School/Morris, \$171,999. Garcia, 506-5363.

3-BDR. HOME, 2 baths, 1,850-sq. ft., updated w/wood floors & granite, 0.24-acre lot, MLS#844378, http://www.virtuallyshow.com/49797, \$220,000. Hughes, 806-676-3584.

7-BDR. HOME, 4,992-sq. ft., ranch-style, walk-out basement, East Mountains, 24 min. to Sandia, open house Aug. 8 & 15, MLS#842530, \$424,900. Weaver, 505-480-9951.

7-BDR. CUSTOM HOME, 5 baths, 4,000-sq. ft., kitchen w/granite, stainless steel appliances, pool, near Cottonwood, \$485,000. Gallegos, 907-1349, ask for Chuck.

VACANT LAND, Tome, NM, near Tome Hill & UNM extension, \$55,000/acre, owner will negotiate price. Ramos, 304-593-3425 or 304-562-8546.

4-BDR. HOME, 2 baths, 2,100-sq. ft., 3-car garage, lovely territorial-style, landscaping, fenced, 2 wooded acres, East Mountains, \$350,000. Miller, 505-205-8098.

3-BDR. HOME, +office, 2-1/2 baths, 2,065-sq. ft., pool, Tanoan, golf course, mountain views, \$359,000. Wise, 505-514-5011.

### WANTED

AFTER SCHOOL CHILD CARE, 9-yr. old, soon to be 10, Mon.-Fri., 3-6 p.m., start Aug. 10, must drive/cook. Post, 977-9890.

WOOD LATHE, 1/2 or 3/4-hp motor, 40-in., to turn baseball bats, 120-volt power. Lowe, 991-0626.

UTV, good to excellent condition. Bell, 239-8606.

LAWN MOWER, gas-powered, w/trimming bag, working or semi-working condition, for free or cheap. North, 514-7878.

VOLUNTEERS, for Fabulous Felines, to work with rescued cats, www.fabulousfelines.org. Stubblefield, 263-3468, fabulousfelines@comcast.net.



### Recent Retirees



Lacey Learson  
43



Brad Skinner  
27

## Sandia takes home 4 FLC awards

(Continued from page 12)

moving subway train taking power off a stationary third rail."

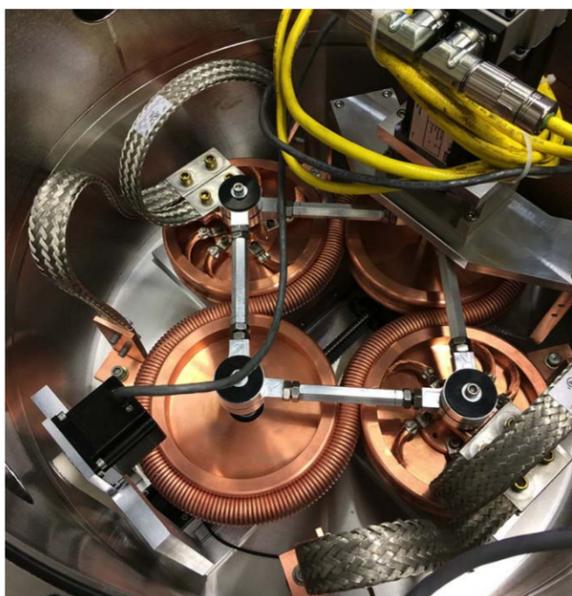
It is done now with a sliding contact device, a brush or shoe that rides along a surface. But sliding electrical contacts easily wear out. "Twistact connects an electrical circuit between something moving and something stationary or, in the case of a wind turbine, something rotating and something not, without a sliding contact and without electrical arcing."

The technology could be important for wind turbines because it makes the use of copper and steel instead of rare earth magnets practical in the generators. "Twistact technology is designed to eliminate the need for high-maintenance components like gear boxes and brush contacts," Jeff says.

Earlier this year, Twistact was chosen for DOE's LabCorps entrepreneurship pilot program. Jeff will receive \$75,000 to develop commercialization plans for the technology and will get business training and have access to other resources.

The FLC is a nationwide network of more than 300 members that provides a forum to develop strategies and opportunities to link laboratory mission technologies and expertise with the marketplace. Its awards program annually recognizes federal laboratories and their industry partners for outstanding technology transfer efforts. Since established in 1984 the FLC has presented awards to nearly 200 federal laboratories. It is considered one of the most prestigious honors in technology transfer.

"Decon technology, Twistact, and a better-fitting prosthesis are great examples of how Sandia's scientific research translates into products that benefit the public," says Pete Atherton, senior manager of Industry Partnerships Dept. 1930. "We look forward to working with partners to make these innovations widely available, and people like Bianca Thayer help make that possible."



THE 2ND-GENERATION TWISTACT TEST-BED results to date are: (1) 2,000 amps operating current [200 percent of original project goal]; (2) 0.65 milliohms series resistance [better than original project goal of 1.0 milliohms]; and (3) 500 rpm operation demonstrated [50 percent of extended project goal (electric vehicles)].

### Mileposts



New Mexico photos by Michelle Fleming



David Clauss  
35



Joel Miller  
35



Pablo Montoya  
30



Bruce Berry  
25



Ken Eras  
25



Jeanne Evans  
25



John Merson  
25



Anna Lord  
15

# Lab to market

## Sandia brings home FLC regional tech transfer awards

By Nancy Salem

Sandia won four regional awards from the Federal Laboratory Consortium (FLC) for its work to develop and commercialize innovative technologies. One of them honored business development specialist Bianca Thayer (8539) as Technology Transfer Professional of the Year.

Sandia technologies recognized by the FLC's Far West/Mid-Continent regions for 2015 are:

- Dynamic Prosthetic Socket System with a Notable Technology Development Award
- Decontamination Technology for Chemical and Biological Agents with an Excellence in Technology Transfer Award
- Twistact with an Outstanding Technology Development Award

The awards will be presented Aug. 26 at the Hilton Airport/Harbor Bay Marina in San Diego, California.

"Sandia is truly honored to be recognized by our peers for our work in technology development and technology transfer," says Jackie Kerby Moore, manager of Technology and Economic Development Dept. 7933 and Sandia's representative to the FLC. "Congratulations to the all principal investigators and teams who are being acknowledged for their inspiring accomplishments."

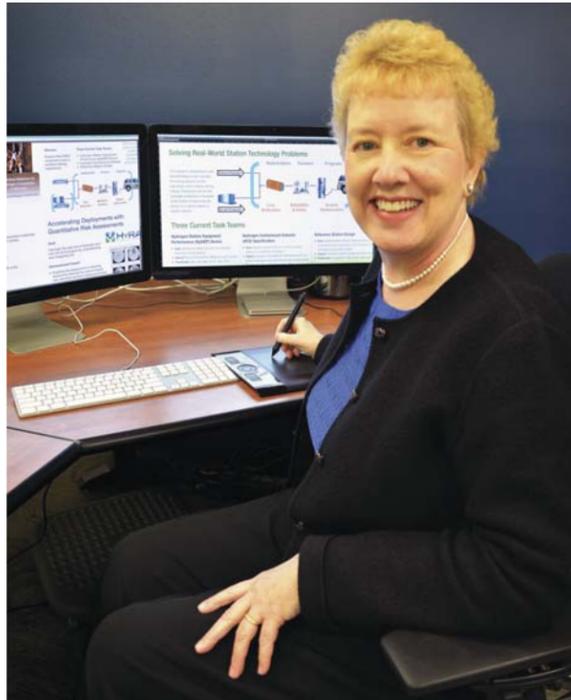
### A passion for tech transfer

Bianca started her Sandia career five years ago as a licensing executive in Albuquerque after working 30 years in industry. She has negotiated new industry and academic partnerships and transferred a wide range of Labs technologies through licensing and cooperative research and development and Work for Others agreements. She also developed the TEDS courses for intellectual property and licensing and has personally trained many technical staff on the value of IP.

Among Bianca's successes was negotiating the patent license in 2012 with UOP Honeywell for crystalline silico-titanates used to remove radioactive cesium from contaminated seawater following the Fukushima nuclear power plant disaster in Japan. She also negotiated numerous new licenses for Sandia's decontamination technology resulting in more widespread use of the product.

"Bianca Thayer has been outstanding to work with on technology transfer," says Mark Rigali (6224). "Her understanding of the mindset of our business partners and the nature of technology being licensed made the tech transfer effort smooth and almost effortless. She's really good at what she does and makes it look easy when it's not."

Her manager, Carrie Burchard, says Bianca, who transferred to Sandia/California in 2013, "is constantly thinking of new ways to help her licensees be successful in commercial-



**BUSINESS BOOSTER** — Bianca Thayer negotiated the patent license in 2012 that led to UOP Honeywell using Sandia's crystalline silico-titanate technology to remove radioactive cesium from contaminated seawater after the Fukushima nuclear power plant disaster in Japan.

izing technologies from Sandia. She's got a true passion for technology transfer."

### A better prosthesis

The national Amputee Coalition says nearly 2 million people in the United States live with limb loss, and about two-thirds have lost a lower limb. Diabetes is the leading cause, accounting for more than 65,000 amputations a year nationwide.

The fit of a prosthesis is a challenge for amputees because fluid in the leg shifts and muscles shrink while walking on an artificial leg. A custom-fit socket doesn't always fit.

Jason Wheeler (6533) has been studying prosthetics at the Labs for a decade and is part of a robotics group that developed a sensor to tell how a limb changes, along with a system that automatically accommodates those changes.

Jason says Sandia's sensor is unique because it detects pressure in three directions: normal and two shear forces on the skin. Shear forces cause such problems as rubbing, blisters, and abrasions, but no appropriately sized commercial sensing system can monitor them, he says.

Sandia's three-axis pressure sensor fits in a liner that slips into the socket of a prosthesis. The system automatically

adjusts socket shape by moving fluid into bladders inside the liners that amputees normally wear to improve a socket's fit and comfort. Since modifying a custom socket would be expensive and cumbersome and could require several fittings, Sandia adapted its technology to fit inside a liner made of elastomeric material similar in thickness to a gel liner.

"With the liner, you just take out your old one and drop in the new one and you're good to go. That's a very important component of this technology," Jason says.

Development continues and more amputee testing is needed, but the technology "is getting mature enough to partner with companies who will commercialize it and make it available to people who need it," he says. Sandia has applied for patents on the technology.

### Hard-working formula

Sandia decontamination technology neutralizes chemical and biological agents using a mix of mild, nontoxic, and non-corrosive chemicals found in common household products such as hair conditioner and toothpaste. It contains both surfactants, which lift agents off a surface, and mild oxidizers, which break down the agent's molecules into nontoxic pieces that can be washed down a household drain like detergent or dish soap.

The product works quickly and kills 99.99999 percent of bacteria, viruses, and fungi. Originally used by the military and first responders, Sandia has licensed the formula to companies that have developed it to battle toxic mold and decontaminate meth labs, disinfect healthcare facilities and schools, remove pesticides from farm equipment and agri-



**METH LAB CLEANUP** — A remediator uses Sandia's decontamination spray on surfaces of a house where methamphetamine was produced. In an hour, the product is rinsed clean with water and the remaining liquids are harmless enough to be put down a kitchen drain. (Photo courtesy of EFT Holdings)

cultural packing plants, and fight the spread of the Ebola virus in Africa. It also has been used as a preventive measure against contaminants at presidential debates and a political convention.

Sandia has promoted the technology, worked with companies to license and commercialize it, and adapted it for new products and uses. Seven new licensees are manufacturing and distributing products based on the Sandia decontamination patents. Efforts continue to add more licensees and product applications.

The decontamination formula was developed with funding from DOE and NNSA Chemical and Biological National Security Program (CBNP).

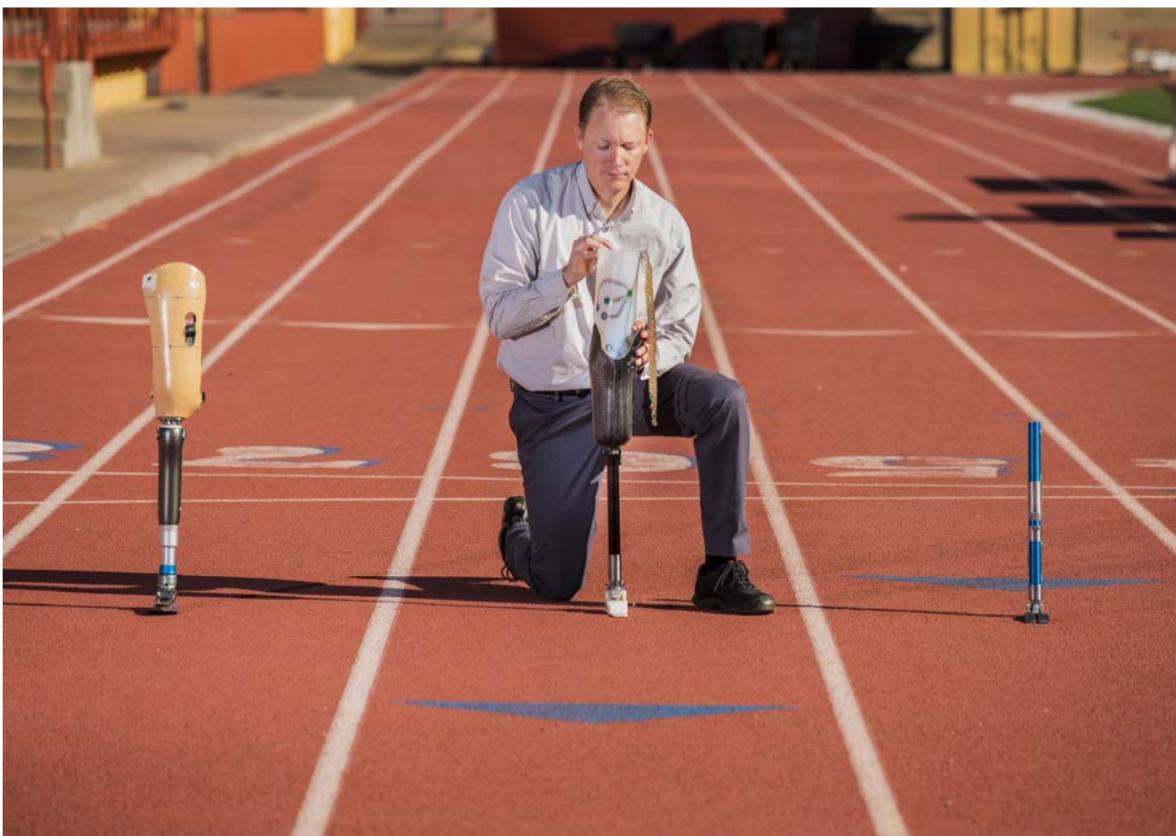
### New approach to an old problem

Sandia's Twistact technology is designed to take wind energy to the next level. "It can eliminate the need for rare earth magnets in multimegawatt wind turbines, which is the last major hurdle to proliferation of cost-effective wind power," says principal investigator Jeff Koplow (8366). "Anticipated rare earth supply disruptions are holding back large-scale investment in wind power."

Twistact also should allow construction of very large wind turbines to achieve better economies of scale that exist at 10 megawatts and beyond, and reduce the weight of wind turbine housings and, potentially, construction costs.

"Twistact is a new approach to the very old problem of how to transmit electrical power between something that moves and something that doesn't," Jeff says. "Think of a

(Continued on page 11)



**HELP FOR AMPUTEES** — Jason Wheeler demonstrates a liner aimed at helping prosthetic limbs fit better. It is outfitted with sensors that tell what's going on in a limb and a system to automatically accommodate changes. (Photo by Randy Montoya)