

Getting bot responders into shape

By Stephanie Holinka

Sandia is tackling one of the biggest barriers to the use of robots in emergency response: energy efficiency.

Through a project supported by the Defense Advanced Research Projects Agency (DARPA), 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 scenarios.

One of Sandia's new robots that showcases this technology will be demonstrated at an exposition to be held in conjunction with the DARPA Robotics Challenge Finals next June.

As the finals draw closer, some of the most advanced robotics research and development organizations in the world are racing to develop emergency response robots that can complete a battery of tasks specified by DARPA. Competing robots will face degraded physical environments that simulate conditions likely to occur in a natural or man-made disaster. Many robots will walk on legs to allow them to negotiate challenging terrain.

Sandia's robots won't compete in the finals next June, but they could ultimately help the winning robots extend their battery life until their life-saving work is done.

"We'll demonstrate how energy efficient biped walking robots could become. Increased efficiency could allow robots to operate for much longer periods of time without recharging batteries," says project lead Steve Buerger of Sandia's Intelligent Systems Control Dept. 6533.

Battery life is an important concern in the usefulness of robots for emergency response.

"You can have the biggest, baddest, toughest robot on the planet, but if its battery life is 10 or 20 minutes, as many are right now, that robot cannot possibly function in an emergency situation, when lives are at stake," says Steve.

The first robot Sandia is developing in

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STEVE BUERGER (6533) is leading a Sandia project to demonstrate how energy efficient biped walking robots could become. Increased efficiency could enable bots to operate for much longer periods of time without recharging batteries, an important factor in emergency situations. (Photo by Randy Montoya)



Div 2000 VP Bruce Walker announces retirement

Bruce Walker, Div. 2000 VP for Weapons Engineering and Product Realization, has announced his retirement. Bruce, Sandia's chief engineer for nuclear weapons, will leave the Labs in mid-December. See page 2.

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Studies look at aging of electronics in nuclear weapons

By Sue Major Holmes

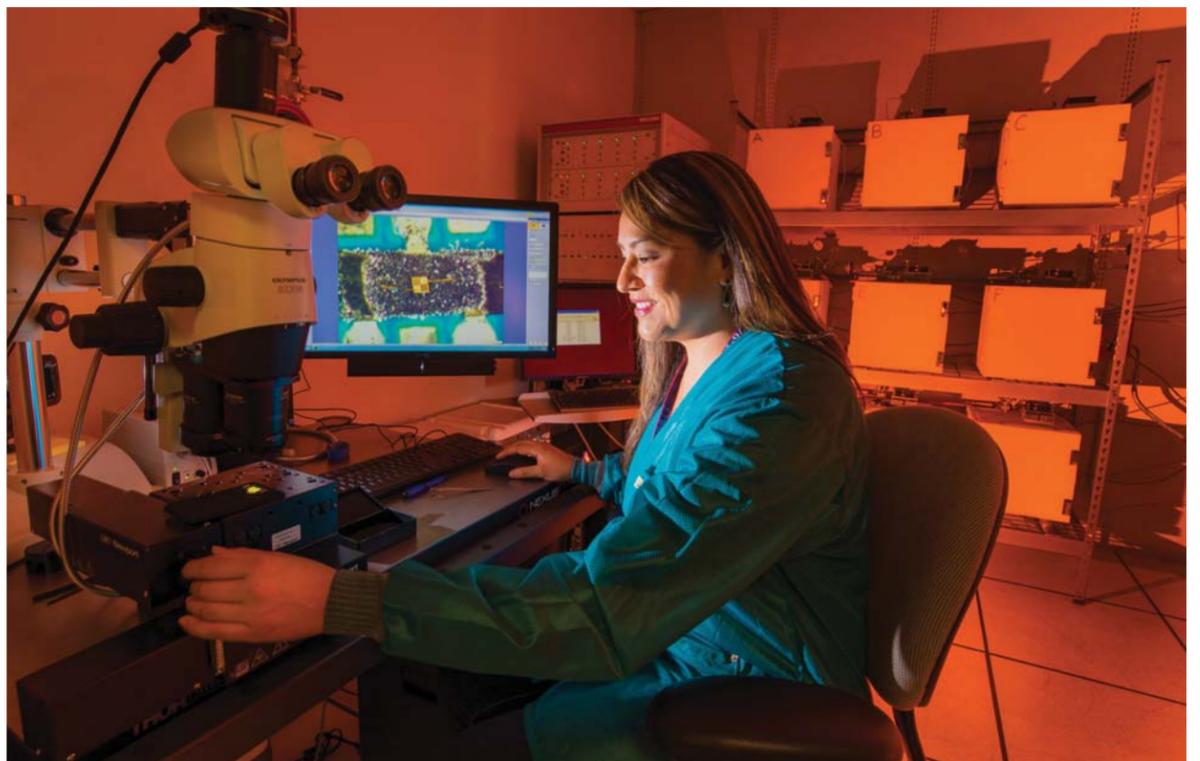
Researchers at Sandia are studying how environments, including radiation that originates from a nuclear weapon itself, could affect the performance of electronics in the W76-1 warhead as they age.

Sandia, which is responsible for most non-nuclear components in US nuclear weapons, is helping replace W76 warheads in the nation's stockpile with a refurbished version under the W76-1 Life Extension Program (LEP). The ballistic missile warhead is carried on the Trident II D5 missile aboard Ohio-class Navy submarines.

Researchers have studied radiation effects since the early days of nuclear weapons. But a 30-year program begun in 2006 will provide real-time data for the first time on how electronics age within the weapon. Studies in the past used techniques that artificially accelerated the aging process based on assumptions resulting from experiments and previous research.

"There has always been the question with accelerated aging data, how reliable is it?" says principal investigator Rachele Thompson (1356).

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DEVICE AGING STUDIES — Rachele Thompson (1356) inspects an electronic device that is part of a 30-year Sandia program that looks at how environments, including radiation from a nuclear weapon itself, could affect the performance of electronics inside a W76-1 warhead. The study begun in 2006 will provide real-time data for the first time on how electronics age within the weapon. (Photo by Randy Montoya)



Giving back

As part of its annual Fall Leadership Forum, Sandia's senior leadership made time to give back to the community. Led by Labs Director Paul Hommert, Sandia VPs and directors pitched in at the Roadrunner Food Bank. See photos and story on pages 6-7.

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Honoring our vets

Special events at the California and New Mexico sites were held this month to honor Sandia veterans of the Armed Forces. A highlight of the New Mexico event was a keynote address by Navajo Code Talker Roy Hawthorne. Photos on pages 5, 8.

That's that

A report has been generating some buzz on the Web for the past few weeks with its assertion that by the year 2025, 50 percent of today's occupations will no longer exist. Why? The usual suspects: Robotics, computerization, and artificial intelligence are going to make fully half the jobs currently being performed in the US obsolete, according to the report, which is based on research done at Oxford University's Martin School.

The report says that 10 years from now – I want to say 10 *short* years – we'll hardly recognize the American workplace. What with the accelerating rate of technological change, many jobs – especially, but not exclusively, those considered to be low-skill positions – will disappear. One newspaper summary of the report concluded that "Workspaces with rows of desks will become completely redundant, not because they are not fit for a purpose, but simply because that purpose no longer exists . . ."

Occupations that require creative thinking and the ability to leverage technology resources – science and engineering jobs fall into this category – appear to be safe . . . for the time being. Given the trends, though, I think there are very few lines of work that can be considered truly bulletproof. The study *does* suggest that the more education you get and the more creativity and social intelligence (whatever *that* is) your occupation requires, the "safer" you are. In other words, most of us at Sandia should be okay (although as I've written here before, computer programs are doing a passably decent job at certain types of journalism).

Maybe you've heard the phrase attributed to Ralph Waldo Emerson: "Events are in the saddle and ride mankind." The comment is usually cited in reference to the geopolitical situation, but I sometimes feel that way about technology: It's racing out ahead of us and we are just barely hanging on by the tail. It can be a fun, even exhilarating, ride, but the fall is likely to be hard, especially if you're among that 50 percent of buggy whip makers destined to be looking for work a decade hence.

The best way to manage change is to prepare for it. We must prepare our students to know what they need to know – not just for today but for a decade and more from now. That's easy to say but maybe not so easy to do: We're talking unknown unknowns here, trying to hit a moving target that is accelerating away from us at red-shift speeds. For most of human history, people knew what things would look like a decade out, a century out, a millennium out. Today, we're lucky if we can see a year or two ahead. A decade, though? That's an eternity.

* * *

The good news here is that the bad news maybe isn't really all that bad. Although the numbers sound alarming – half of all occupations will disappear! – the fact is, today's global economy constantly creates job churn, with occupations rising and falling like the tides. How many of today's jobs didn't exist in 1950? In 1980? A lot. And even of the jobs that are still around, how many – from parenting to plumbing – are done the same way they were back in the day? Not many. Things change and society adapts. As the report notes: "Losing occupations does not necessarily mean losing jobs – just changing what people do."

* * *

Do you find yourself wondering where all of this is going? I do. I recall reading a comment by Arthur C. Clark a while back. The renowned writer and futurist once said that the biggest challenge for humanity in the future would be to figure out what to do with virtually limitless leisure time.

If I recall the context, Clarke was envisioning a world where almost all of the mundane tasks and most of the work now done by people would be done by computers and robots. Our technologies would do the work and generate the wealth and we would reap the benefits. There'd be no crime or conflict because everyone would share in the bounty created by our machines.

It's not hard to imagine the sort of utopia that could ensue. But it's not hard, either, to envision a dystopian turn where people with nothing they *have* to do would eventually get up to no good. As Clarke fully understood, it could go either way – or both ways. That's why he considered it a challenge.

I can imagine sitting on a beach sipping a tall iced tea delivered by a dutiful robot that is also writing my Great American Novel for me, asking myself the same question a character asked in Kurt Vonnegut's *God Bless You, Mr. Rosewater*: "What are people *for*?"

See you next time.

– Bill Murphy (MS 1468, 505-294-1778, wtmurph@sandia.gov)

Div. 2000 VP Bruce Walker announces retirement

Bruce Walker, Div. 2000 VP for Weapons Engineering and Product Realization, has announced his retirement. The chief engineer for nuclear weapons will leave the Labs in mid-December.

Bruce, who has been with Sandia for 37 years, was named to the vice president's job in December 2011. In that post, he has been responsible for leading nuclear weapon engineering and production activities.



BRUCE WALKER

"I am delighted to have been part of the continued progress we have made at the Labs, in Division 2000, and in the NW program over these past three years," he says, adding, "I will miss the work, the Labs, and the impact we make to our nation's security, but of course will miss the people the most."

Sandia expects to announce a successor shortly.

Bruce joined Sandia in 1977 and spent the next seven years as a member of the technical staff, working on the design of numerous nuclear weapons systems and DoD radar programs.

During his career, he was director of four separate centers at Sandia. From 2010 to 2011, he directed Nuclear Weapons Planning Operations and Integration Center 200, serving as chief operating officer for the NW program.

From 2008 to 2010, he was responsible for the Remote Sensing and Verification Program as director of Monitoring Systems and Technology Center 5700. He headed the New Mexico Weapon Systems Engineering Center from 2005 to 2007. There, he was responsible for system engineering, use control, and stockpile support for New Mexico nuclear weapon systems.

From 2002 to 2005, he directed the Surety Components and Instrumentation Center, leading the development of nuclear safety and firing system components for several nuclear weapon systems and development of instrumentation and communication systems for various DoD programs.

He was the senior manager for RF remote sensing from 1998 to 2002 after 11 years managing the Synthetic Aperture Radar (SAR) department. Bruce was instrumental in establishing Sandia's SAR work and holds a patent in synthetic aperture radar for video SAR. Before that, he managed the Sensor Systems Department and worked on development of ground-based sensor programs.

Bruce, a Fellow of the Microwave Sensing Symposia, received a Bachelor of Science degree in electrical engineering from Oklahoma State University and a Master of Science degree in electrical engineering from the University of Texas.

— Sue Major Holmes



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Bill Murphy, Editor 505/845-0845

Randy Montoya, Photographer 505/844-5605

Mike Janes, California site contact 925/294-2447

Michael Lanigan, Production 505/844-2297

Contributors: Michelle Fleming (Ads, Milepost photos, 844-4902), Neal Singer (845-7078), Patti Koning (925-294-4911), Stephanie Holinka (284-9227), Darrick Hurst (844-8009), Stephanie Hobby (844-0948), Heather Clark (844-3511), Sue Holmes (844-6362), Nancy Salem (844-2739), Tim Deshler (844-2502), Valerie Larkin (284-7879), Valerie Smith, manager (844-6167)

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Sandians bring nearly 400 turkeys to work



SANDIA DELIVERED nearly 400 turkeys to Roadrunner Food Bank Tuesday, Nov. 18, donated by members of the workforce for Take a Turkey to Work Day. Volunteers from throughout the Labs organized the collection points, advertised the event, and collected them for transport to the food bank. Roadrunner will see that the turkeys find their way to the tables of hungry families in need of emergency food. Since 2002, Sandia's Community Involvement Department has organized the annual turkey donation day. This holiday season, consider contributing to Sandia's effort to provide gifts for 500 foster children through New Mexico's Children, Youth and Families Department. For more information visit the Holiday Gift Drive SharePoint site at <http://tiny.sandia.gov/w7wsh> or see Sandia's Community Involvement page at <http://tiny.sandia.gov/7aod8>.

Sandia donation brings high school machine shops into the computer age

Students will learn on the same computer numerical control equipment used on the job

By Patti Koning

One person's trash is another's treasure — or in this case, one national laboratory's slightly outdated manufacturing tool is perfect for training high school students. Sandia recently donated three industrial-grade machine shop tools to Livermore and Granada high schools.

"In an industrial setting, equipment needs to meet tight manufacturing tolerances," says manufacturing team lead Brian Cass (8247-2). "But a learning environment doesn't require the same level of precision."

New equipment transforms learning opportunities

The donated equipment — two Haas vertical mills and a Haas horizontal lathe — features computer numerical control (CNC), the industry standard. But most high school machine shop programs have outdated manually controlled equipment because they can't afford to upgrade.

About 20 years ago, Brian took machine shop classes at Granada High School. A lot has changed since, but not the equipment. The tools Brian learned on are still being used today.

"This donation is transformative. We don't have money for more modern equipment, even second hand," says Granada High School shop teacher Don Danner. "Now students will learn on the same kind of tools they will use on the job."

Donating equipment no easy task

The donation was nearly two years in the making. The idea came to Brian and his manager Larry Carrillo (8247) through their work with the Livermore Valley Unified School District and the Metals Advisory Council. Organized by Danner and Livermore High School shop teacher Ed Woodworth, the group brings together Tri-Valley machine shop educators and industrial partners to help keep machine shop programs relevant.

"We knew right away that the machine shops could make great use of these tools that no longer met our requirements," says Brian. "But donating surplus government property takes time."

Asset management specialists Jack Euske (8523) and Phil Rivera (10264) established an equipment donation program under the Stevenson-Wylder Technology

A TEAM EFFORT — Sandia, the Livermore Valley Joint Unified School District, and the Metals Advisory Council worked together to make Sandia's donation of machine shop tools to Livermore and Granada high schools possible. Shown here in front of the Haas horizontal mill are, left to right, Don Danner; Ed Woodworth; Tony Castruccio, owner of Custom Gear & Machine and Metals Advisory Council industry partner; Brian Cass (on stool); Larry Carrillo; Kelly Bowers, Livermore Valley Joint Unified School District superintendent; Jack Euske, Sandia logistics; Terry Spraggins, Sandia logistics; and Stephanie Beasley. Not shown: Kelly Wendell, Sandia machinist.

(Photo by Dino Vournas)



Innovation Act, which allows government agencies to donate excess equipment for research and education. The solid-state memory boards were removed from the equipment; Haas and Selway Machine Tool Company then donated replacements and labor to bring the equipment back on line. Kelly Wendell (8247-2) helped arrange that donation. Terry Spraggins (8523) handled the logistics and internal reviews to transfer ownership to the schools.

High school machine shop gave Brian an early start

Brian plays a deeper role than leading the equipment donation. He is a role model for how high school Regional Occupation Programs can train students for the workforce. Wanting to follow in the footsteps of his father, who was a machinist at Lawrence Livermore National Laboratory, he took shop classes from Danner at Granada High School. As a sophomore in high school, he enrolled in the Machine Tool Technology Program at Chabot Junior College in Hayward and had a manufacturing job by the time he graduated from high school.

"Many schools are eliminating machine shop programs because they are expensive," says Brian. "We want to help support the programs at our local high

schools. These programs can train students for good jobs in manufacturing, jobs they can start right out of high school or with a few years of training, like I did."

Stephanie Beasley (8521), community relations and economic development officer for Sandia's California site, says the lab has a vested interest in seeing more students follow STEM (science, technology, engineering and math) career paths, including those in advanced manufacturing. "This donation is one example of how we are working with our schools to better align the classroom with the realities of the new advanced manufacturing workplace," she says.

Last year, Sandia developed the Design to Manufacturing Academy, which brought students into the laboratory to experience the entire manufacturing process from initial planning and design to testing to failure. "Broadening students' view of STEM careers will ensure that more pursue these opportunities. In return, they will help the US maintain its competitive edge in innovation, science, and technology," says Stephanie.

Sandia California News

Habib Najm, Lyle Pickett, and Chris Carlen receive 2014 CRF awards

By Patti Koning

Sandia's Combustion Research Facility has announced that Habib Najm (8351) is the winner of the 2014 O. W. Adams Award and Lyle Pickett (8362) is the winner of the 2014 K.E. Bastress Award. Chris Carlen (8362) won the K. R. Hencken Award, which was introduced this year. In addition, Robert Barlow (8351) was recognized for receiving the Combustion Institute's Alfred E. Edgerton Gold Medal.

"The Adams, Bastress, and Hencken awards represent how much we value quality in our work at the CRF," said CRF director Bob Hwang (8300). "They are a tremendous honor because your peers are the ones voting."

O. W. Adams Award

Named after Bill Adams, DOE's original CRF sponsor, the O. W. Adams Award was established in 1986 and is given every other year to Sandians who have made exemplary research contributions to the CRF. Habib received the 2014 O. W. Adams Award for his deep and long-lasting contributions in a number of areas, notably in direct simulation and analysis of reacting flow with detailed chemistry, algorithms for uncertainty quantification and inference, and computational singular perturbation methods for model reduction in deterministic and stochastic models. His contributions have made an impact throughout the CRF combustion program as well as across Sandia and in the broader international research community.



2014 COMBUSTION RESEARCH FACILITY AWARD recipients are (left to right), Robert Barlow (8351), Combustion Institute's Alfred E. Edgerton Gold Medal; Lyle Pickett (8362), 2014 K. E. Bastress Award; Habib Najm (8351), 2014 O. W. Adams Award; and Chris Carlen (8362), K. R. Hencken Award, which was introduced this year.

(Photo by Dino Vournas)

K.E. Bastress Award

Dedicated to the memory of Karl E. Bastress, who guided early combustion research activities for DOE, the K.E. Bastress Award recognizes Sandians whose exceptional contributions have led to a strong and effective coupling of CRF programs to the needs of US industry. Lyle received the 2014 Bastress Award for his pioneering contributions to understanding fuel spray vaporization, ignition, flame liftoff and stabilization, soot formation, and turbulent spray mixing processes

under harsh engine conditions, as well as for creating and leading the internationally acclaimed Engine Combustion Network for collaborative engine fuel spray research.

K. R. Hencken Award

The K. R. Hencken Award recognizes outstanding technical innovation and meticulous laboratory work in support of CRF research. The award is named for Ken Hencken, a longtime innovator of experimental design in the CRF, who made outstanding contributions to several research programs during his career. Ken's work always demonstrated a deep technical knowledge of the investigated processes and incorporated the latest electro-optical technologies to achieve the optimal experimental configuration.

Ken was on hand to present the inaugural award to Chris. "I am truly honored to have my name associated with this award," Ken said. "You truly represent the intent of the award and have set a high benchmark."

Chris was recognized for his innovative designs that have enabled both the CRF's Vehicle Technologies and Basic Energy Science combustion programs to have unique experimental capabilities. Chris' designs have included high-power pulsed light-emitting diodes (LEDs), frequency- and phase-locked high-speed mechanical shutters, field-programmable gate array engine controllers, and the engine laser "phaser."

Rad studies

(Continued from page 1)

The long-term project combines experiments, also known as physical simulation, with computational simulation and analysis. The approach developed as part of this project can be used in future LEPs, says manager Steve Wix (1356). Costs should be reduced for future stockpile surveillance and monitoring as well, since such lab-based studies cost less than accelerated aging techniques, which require using large environmental test facilities.

Study important in moving more toward predictive models

The project by Sandia's Electrical Sciences Group 1350 is important for science-based stockpile stewardship because new electronic parts have been introduced into the W76-1 system since production began in 2008. The parts must function with assured reliability and performance throughout the life of the system. The project also is moving such evaluations toward more predictive models of aging for stockpile stewardship, Steve says. Stockpile stewardship assures the safety, security, and reliability of weapons in the absence of the underground nuclear tests the US halted in 1992.

The Commercial-Off-the-Shelf Electronics Component Engineering Dept. 2634 is collaborating on the study, which is sponsored by Stockpile Evaluation Dept. 2952 and is based on innovative technology developed by Kevin Horn in Radiation Effects Experimentation Dept. 1343.

Most of the experiments and analysis are done in a small laboratory full of racks of test and computer equipment and in an adjacent room packed with small test chambers, square white boxes that resemble miniature refrigerators. Each test chamber contains parts in a unique environment that is continually monitored to control temperature, relative humidity, and vibration frequency to ensure consistent levels of the multiple aging processes that will take decades.

Researchers develop and use advanced, physics-based computational simulations to predict how the electronics will perform as they age. They verify their predictions with experiments on the electronics to improve their understanding of the underlying physics engaged during the aging process. This research then guides further development of these critical simulation capabilities to resolve differences between the computer simulations and the aging experiments. The experiments are overseen by test engineer Monica Espinosa.

The researchers monitor thousands of devices that fall into six families of transistor and diode types. Hundreds are removed annually from the test chambers to determine their electrical performance under various operating conditions. The long-range test schedule was developed to assure that an adequate number of devices remain available for testing over the entire three decade-long study.

The parts under study were pristine when the project started eight years ago. Steve and Rachele say no significant aging changes were expected in these early years, and what they have seen matches those predictions. Currently, only simple electrical devices are being tested, but researchers hope to add more complex parts

Nuclear Weapons Labs-wide webcast



A Nuclear Weapons (NW) Mission Area webcast is available for internal Labs-wide viewing at <http://tiny.sandia.gov/85x07>.

Presented by Jerry McDowell, Deputy Laboratories Director & Executive VP for National Security Programs, the recently released NW video webcast takes a slightly different approach to the traditional NW All Hands.

It includes a NW programmatic briefing; technical updates on current stockpile programs from Director Jim Handrock (2100) and Senior Manager Tedd Rohwer (2120); an inspirational NW video tour with new footage from New Mexico, California, and Nevada; a discussion of the future focus for the NW Mission Area; and a special "thank you" viewers will not want to miss.

Just under 30 minutes, the webcast is unclassified, Official Use Only/Export Controlled Information. Submit webcast feedback to nwcomm@sandia.gov.

later in the project.

Exposing devices to laser-based testing

Once the devices have aged in the predetermined storage environments, the team uses a sophisticated laser-based technique to expose each one to more hostile short-duration operating environments, Rachele says.

Researchers take basic electrical measurements on aged transistors and diodes, then repackage them in preparation for evaluation with a benchtop laser-based simulated radiation environment source. They expose the parts to two different types of lasers: a broad beam that sweeps the entire device and a focused laser beam

to expose it in specific areas. This process evaluates the performance of aged devices in more harsh environments. It takes up to 15 to 20 minutes for each test, and the project studies hundreds of parts per year, Rachele says. "There is a lot of handling of parts and data analysis involved," she says.

Unless the part is damaged or fails during testing, it goes back into the appropriate aging environment for future testing. The team evaluates each damaged or failed part to better understand the underlying cause.

The techniques Sandia is developing will help officials make future stockpile decisions based on an improved understanding of the impact of aging on how parts perform in multiple environments, Steve says.

Bot responders

(Continued from page 1)

support of the DARPA Challenge, is known as STEPPR (Sandia Transmission Efficient Prototype Promoting Research). It is a fully functional research platform that allows developers to try different joint-level mechanisms that function like elbows and knees to quantify how much energy is used.

Sandia's second robot, WANDERER (Walking Anthropomorphic Novelty Driven Efficient Robot for Emergency Response), will be a more optimized and better-packaged prototype.

The key to the testing is Sandia's novel, energy-efficient actuators, which move the robots' joints. The actuation system uses efficient, brushless DC motors with very high torque-to-weight ratios, very efficient low-ratio transmissions, and specially designed passive mechanisms customized for each joint to ensure energy efficiency.

"We take advantage of dynamic characteristics that are common to a wide variety of legged behaviors and add a set of 'support elements,' including springs and variable transmissions, that keep the motors operating at more efficient speed/torque conditions, reducing losses," Steve says.

Electric motors are particularly inefficient when providing large torques at low speeds, for example to a crouching robot, Steve says. A simple support element, such as a spring, would provide torque, reducing the load on the motor.

"The support elements also allow robots to self-adjust when they change behaviors. When they change from level walking to uphill walking, for example, they can make subtle adjustments to their joint dynamics to optimize efficiency under the new condition," Steve says.

Robots must adapt to the diverse kinds of conditions expected in emergency response scenarios.

"Certain legged robot designs are extremely efficient when walking on level ground, but function extremely inefficiently under other conditions or cannot walk over different types of terrains. Robots need an actuation system to enable efficient locomotion in many different conditions," Steve says. "That is what the adjustable support elements can do."

Early testing has shown STEPPR to operate efficiently and quietly.

"Noise is lost energy, so being quiet goes hand-in-hand with being efficient. Most robots make a lot of noise, and that can be a major drawback for some applications," Steve says.

STEPPR's and WANDERER's electronics and low-level software are being developed by the Open Source Robotics Foundation. The designs will be publicly released, allowing engineers and designers all over the world to take advantage of advances.

The Florida Institute for Human and Machine Cognition is developing energy-efficient walking control algorithms for both robots. The Massachusetts Institute of Technology and Globe Motors also are contributing to the project.

Sandia's robotic work will be demonstrated in the technology exposition section of the DARPA Robotics Challenge, scheduled for June 5-6 at Fairplex in Pomona, Calif.

"Noise is lost energy, so being quiet goes hand-in-hand with being efficient. Most robots make a lot of noise, and that can be a major drawback for some applications."

— Sandia researcher Steve Buerger

California Veterans Day event focuses on supporting vets as they return home

By Patti Koning • Photos by Dino Vournas



SANDIA PROTECTIVE FORCE MEMBERS Sgt. Jose Alves Jr., National Guard, and Tate Taylor, retired US Navy, present the national colors.



SGT. JOSE ALVES JR. salutes as Grant Hughes plays "Taps" to close out the Veterans Day commemoration.

On the morning of Nov. 11, members of the workforce (MOWs) at the California Laboratory took time out to commemorate Veterans Day.

"We are here today to thank and honor the many veterans who have served our country, many who have given their lives as part of our military," said Div. 8000 VP Steve Rottler. He then recited the poem *For the Fallen*, written by Robert Laurence Binyon at the start of World War I.

Lt. Cmdr. (retired) Doug Abbott (8248) reflected on his 20-year career in the United States Navy. As a naval surface warfare officer, or as he put it, someone who drove ships for a living, he recalled being immersed in his job and the small community aboard the ship during deployment.

"We worked and played together under operational stress, developing tremendous camaraderie that I have never experienced elsewhere," said Doug. "You miss your family and friends, but you also identify with this group and rely upon them. Then the day arrives that you go home. You are excited, but when you get there, it's not the same as when you left."

He noted that his return from deployments was eased by remaining on active duty with the Navy. "I believe that we have an obligation to ensure that our veterans receive the support they have earned," he said. "I encourage each of us to provide that support as they transition."

Tamara Cagney (8527), who served as an officer in the Army Nurse Corps during the Vietnam era, also spoke about the difficulty of transitioning between military and civilian life.

"The Iraq and Afghanistan wars are the longest sustained military operations since the Vietnam War. Since 9/11, we have sent 2.2 million soldiers into battle, 280,000 of whom are women," she said. "It's a different group from when I was in the service. Deployments are longer, more frequent, and with shorter breaks in between. More parents of young children are being deployed, as well as National Guard members and reservists who do not have the support of the military family.

"Most veterans acclimate and readjust without a lot of trouble. It's a struggle, but not a sustained one," she said. "But other veterans struggle mightily. What I can do is remind veterans and their families that seeking solutions to their problems is a strength. Many people care." She encouraged MOWs to look for ways to help in their communities, noting that programs range from therapy dogs to scuba diving for wounded warriors.

The Thundertones (Sarah Allendorf [8340], Susanna Gordon [8966], Rachael Gupta [8100], Kevin Krenz [8135], Levi Lloyd [8965], Gabe Nunez [8949], Todd Plantenga [8958], Barbara Walker [8634], and Deneille Wiese-Smith [2554]) performed the national anthem while Sandia protective force members Sgt. Jose Alves Jr., National Guard, and Tate Taylor, retired US Navy, (both 8511) presented the national colors. The Thundertones then led the audience in singing "My Country 'Tis of Thee."

To close out the ceremony, everyone observed a moment of silence, followed by "Taps" performed on the trumpet by Grant Hughes.



TAMARA CAGNEY, who served as an officer in the Army Nurse Corps during the Vietnam era, speaks about the difficulty of transitioning between military and civilian life.



ATTENDEES OBSERVE a moment of silence to commemorate Veterans Day.



THE A CAPELLA THUNDERTONES wowed the audience with their renditions of the national anthem and "My Country 'Tis of Thee."

Bank on us

Labs leadership pitches in to help New Mexico's hungry

The 2014 Fall Leadership Forum (FLF) kicked off Tuesday, Nov. 4, with a working visit to Roadrunner Food Bank in Albuquerque. As the state's largest food bank, Roadrunner distributes more than 26 million pounds a year to a network of hundreds of partner agencies and four regional food banks, feeding nearly 40,000 hungry people a week.

Sandia donated \$20,000 to Roadrunner and executives got to work boxing and labeling food. They filled 1,025 Backpacks for Kids, labeled 840 jars, boxed 10,360 pounds of dry goods, and bagged or boxed 12,530 pounds of produce. "It was a great

opportunity to help folks in our community and team with co-workers," says Tim Knewitz, director of Finance and Indirect Business Management Center 10500, and chairman of this year's forum. "Roadrunner has to help a lot of people; it's very impressive. It was a fun activity and we all enjoyed it."

Melody Wattenbarger, Roadrunner president and CEO, says Sandia has been a longtime and valued supporter of the food bank. "We can't thank you enough for your continued generosity," she says. "Sandia's contributions in volunteer hours and dollars have made a big difference in what we do to feed the hungry."

About 90 directors, VPs, executives, and speakers participated in the three-day FLF. Following Roadrunner, the group traveled to Santa Fe then spent the day Wednesday at Los Alamos National Laboratory, where they met with Director Charlie McMillan and other lab executives and went on tours. The forum wrapped up Wednesday evening and Thursday with meetings and strategic activities. Organizers said it was the best-attended fall forum ever; only two directors couldn't make it.

Story by Nancy Salem • Photos by Randy Montoya





Sandia honors its veterans

An unbreakable code



Story by Valerie Larkin • Photos by Norman Johnson

Sandia/New Mexico's Veterans Day observance, held Nov. 10 in the Steve Schiff Auditorium, featured guest speaker Roy Hawthorne, a Navajo Code Talker and retired Baptist minister. Hawthorne recounted the successes of the Navajo Code Talkers in World War II and spoke with pride about being part of the team that developed an unbreakable code. "On every island where the Marines landed, the Navajo Code was used, and it changed the face of the battle right then. . . . I shall never forget the memory of those who gave the ultimate sacrifice. Some people have called the Navajo Code Talkers heroes. My attitude is that the real heroes are those men and women who did not return to this country. They're the real heroes." The well-attended event also included a cake-cutting ceremony in honor of the 239th birthday of the US Marine Corps and a presentation of commemorative coins to Sandia's veterans and active service members during which the Sandia Singers presented the service song of each military branch. An information fair held in the lobby before and after the ceremony featured organizations that support active service members, veterans, and their families.



PABLO GARCIA (4237-5) and Naomi Baros (4237) check out the information at the Military Support Committee table at the Sandia/New Mexico Veterans Day observance. Pablo retired from the US Army after 25 years of service, including tours in Iraq in 1992 and 2003-2004.



LABS DIRECTOR Paul Hommert presents keynote speaker Roy Hawthorne, a Navajo Code Talker in World War II, with a small token of the Labs' appreciation of his service.



THE KIRTLAND AIR FORCE BASE honor guard presents the colors during the Sandia/New Mexico Veterans Day observance.



EUGENE McPEEK (4236) shares a moment with keynote speaker and Navajo Code Talker Roy Hawthorne. Eugene is a US Marine Corps veteran.



STAFF MEMBERS of the Employer Support of the Guard and Reserve greet Sandia veterans.



THE SANDIA SINGERS offer up a rousing rendition of "My Country 'Tis of Thee."



20-YEAR US AIR FORCE veteran Jim Green (10222) and Navy veteran Shirley Vassell-Rampersad (10243) show off their patriotic spirit at Sandia/New Mexico's Veterans Day observance.



ATTENDEES at the New Mexico Veterans Day observance get information about support services available for Sandians who have served in the Armed Forces.



DIV. 4000 VP MIKE HAZEN, left, thanks Chuck Crawley (4848-4), a 20-year veteran of the United States Marine Corps, for his service. Mike is a retired US Air Force officer.

Sandia signs MOU with NM Museum of Natural History

By Neal Singer

Sandia President and Labs Director Paul Hommert signed a memorandum of understanding (MOU) with the New Mexico Museum of Natural History and Science's executive director Charles Walter and foundation executive director Jotina Trussell last Friday at the museum's Young Learners Hands-On Center. The museum is located at 1801 Mountain Road NW in Albuquerque.

"Sandia and the museum hold a common interest in exposing young learners to science, technology, engineering, and math," said Paul. "Sandia has been a long-time partner of the museum, and this MOU provided a vehicle to strengthen that relationship."

In the MOU, Sandia agreed to serve as a technical resource in identifying and developing programs, exhibits, and speakers that will help extend the museum's education mission in the fields of space and space exploration, energy and alternative energy, water, and micro and nano technology. The museum will help evaluate technological and educational initiatives of possible interest to Albuquerque and the surrounding region.

Supporting lifelong learning

In the past year, Sandia gave \$70,000 for the museum to purchase technical equipment to help provide its young visitors with state-of-the-art learning in science, technology, engineering, and math. The technology also supports lifelong learning.

Over the preceding 15 years, Sandia has supported the museum's Naturalist Center, which provides educational opportunities for children of all ages to handle specimens and explore the natural world; the Choco-



SANDIA PRESIDENT AND LABS DIRECTOR Paul Hommert, center, New Mexico Museum of Natural History and Science Executive Director Charles Walter, and museum foundation Executive Director Jotina Trussell enjoy a light moment after signing a Memorandum of Understanding between Sandia and the museum. (Photo by Randy Montoya)

late Fantasy annual gala fundraiser; and the Junior Docent program, which not only provides students with natural history and science content but also builds their confidence by having them offer exhibit explana-

tions to enhance the experience of museum visitors. Sandia support began in 1999 with \$1 million to the museum's Dyna Theater; contributions to date have totaled approximately \$1.5 million.

Engineered Safety

Tonopah Test Range: mitigating unacceptable consequences

By Sue Major Holmes

For Tonopah Test Range (TTR) manager Brian Adkins (2915), safe plus safe equals safer.

Test units from stockpile surveillance flights that slam deep into the dirt at TTR have to be excavated for post-mortem analysis. Recovery crews auger out a hole and shore it up so team members can climb down attached ladders to ready the test unit for removal. Up top, the team uses a recovery platform with rails for the surface recovery personnel.

It's not always possible to tell exactly where a test unit lies underground, so at times the team has to enlarge the hole or dig a second one and adjust the platform. The smaller platform used in the past, when shifted, exposed part of the original hole. Team members also had to remove its railings each time they moved it, which required extra vigilance around a potential open hole.



Team TTR saw a challenge and developed a larger, safer platform with attached handrails to use in recovery operations for a higher degree of engineered safety for everyone involved.

A more stable platform

The larger platform is more difficult to move, but that's handled with a trailer with a specially designed carriage so the platform can be loaded and unloaded with a crane.

"It allows us to reposition the engineered safety cover over any other adjacent hole we have to dig to find the unit," Brian says. The larger surface — 2 to 2.5 times bigger than the old 12-foot-square platform — also spreads the load so the platform is more stable.

"Even if we only drill one hole, it's still safer," says Brian, who also says the new platforms, which have been used for about a year, mitigate one of the highest risks identified in the site's safety case evaluation of hazards in recovery operations.

Brian notes Tonopah is four hours from a trauma center and says, "You look at



SAFER PLATFORM — Sandia's team at Tonopah Test Range saw a safety challenge with a platform used in recovery operations after stockpile surveillance flights. The team developed a larger, safer platform with attached handrails for a higher degree of engineered safety for everyone involved. (Photos courtesy of Tonopah Test Range)

safety with a different perspective when care is not down the street. This platform is a critical engineering measure to mitigate an unacceptable consequence."

Says TTR senior manager Jay Vinson (2910): "Our team at TTR strives for continuous improvement in the safety of its operations, and I am proud to be a part of their team."

Mileposts

New Mexico photos by Michelle Fleming
California photos by Dino Vournas



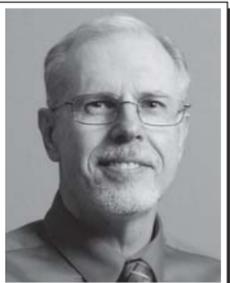
Fred Harper
35 6630



Phil Hoover
35 2152



Rob Rechar
35 6222



Tommy Cabe
41 5635



Pat Sena
35 2220



Joe Chiu
30 428



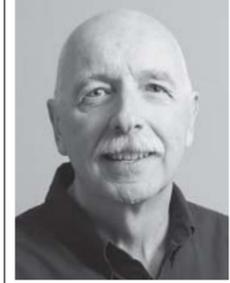
Perry Cowen
30 2216



Fran Current Jr.
30 2996



Jeffrey Danneels
30 6610



Wayne Potter
34 4824



Pat Smith
33 700



Pablo Garcia
30 6830



Rick Harris
30 280



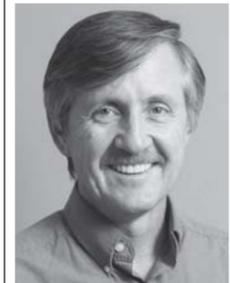
Mike Neilsen
30 1526



Harold Ortiz
30 5963



Paul Vrabel
30 2635



Darell Rogers
25 4822



David Peercy
24 420



Chuck Yagow
30 2991



Janise Baldo
25 1520



Jim Davis
25 98



Mike Dugger
25 1818



Terri Galpin
25 1545



Karen Gardner
25 3500



Karen Griego-Peralta
25 6925



Jeff Gruda
25 158



Reed Jackson
25 5635



Bill Jenkins Jr.
25 210



Allison Kane
25 2214



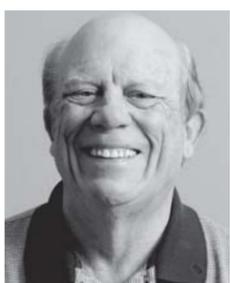
Irene Kolb
25 2992



Ron Maes
25 2155



Liz Monia de Madrid
25 10627



Gary Nordyke
25 2957



Timothy Peterson
25 4821



Jill Rivera
25 5562



Michael Russell
25 2547



Larry Schoof
25 2916



Mike Skaggs
25 5793



Bryan Spicer
25 2242



Doug Vrieling
25 8512



T.C. Hobson
20 9329



Nancy Irwin
20 5524



Jeff Jarry
20 4144



Marcie Jordan
20 10667



Maryann Krauss
20 4144



Alfred Romo
20 10245

Recent Retirees

Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads

Classified Ad deadline change. Due to the Holiday Shutdown, the deadline for the January 9, 2015 Lab News will be noon on Wednesday, Dec. 24.

MISCELLANEOUS

UPRIGHT PIANO, 1912 Weber, w/bench, former player, tuned, good condition. Thibeau, 505-239-8696.

MAYTAG WASHER, 2 yrs. old, great condition, \$175; nightstand, w/drawer, nice, \$20; TV stand w/drawer & doors, \$30. Willis, 505-304-5034.

DVD PLAYER, Sony, w/remote, used, \$25; mud flaps, from '13 Toyota Tundra, OEM, set of 4, \$35. Hennessey, 505-269-6243.

LADDER, 20-ft., Little Giant, w/step & window bar, \$275; Bluetooth Beats head set, w/accessories, new-in-box, \$150. Ayers, 349-1793.

SLEIGH BED FRAME, twin, light wood, box spring, & 2-drawer set, \$250/all. Lobato, 507-9171.

PING PONG TABLE, folds to allow single player, good condition, you haul, free. Montoya, 342-0043.

DINING TABLE, wood, w/6 cloth chairs, only \$60 OBO. Romero, 307-9389.

QUILT RACK, \$30; file cabinet, metal, 2 drawers, \$55; BMX/motorcycle pants, young men's, size 28, \$35; chest protector jersey, Ballistic, young adult, small, \$60. Brewster, 238-4704.

TIMESHARE/CONDO RENTAL, 2 or more nights, 1-2-bdr., Durango, Pagosa Springs, \$100-\$120/night, call for availability. Fernandez, 505-238-4722.

DINING SET, Thomasville, 6 chairs, extension leaf, service cart, table & leave have protective covering, excellent covering, \$500 OBO. Carson, 505-822-0142.

BLACK FOAM EXERCISE ROLLER, firm, 6" x 36" round, like new, purchased from SERP for \$25, asking \$12. Prent, 294-0033.

WHEELS/TIRES, for Chevy 3/4/8 lug, 16"x6.5", GM factory chrome wheels, \$250 OBO. Barreras, 604-8671.

GOLF CLUBS: Ping i-20 irons, only 1 yr. old, \$250; Odyssey White Hot blade putter, \$50. Reece, 414-3018.

WINTER SNOW TIRES, 4, lightly used, 1 season, Mastercraft GlacierGrip II, 175/65 R14 M&S 82T, best offer. Watson, 281-2691.

TIRES, 4, 14-in., wheels, trim rims, \$150/all. Creange, 710-7517.

REFRIGERATOR, Haier, 1.7-cu. ft., white, \$45; 100-lb. propane tank, 24-gal., \$75. Prior, 239-9586.

ZAGER GUITAR, ZAD80CE, gorgeous, high-gloss rosewood, w/red cedar, built-in tuner, equalizer, pickup, hard case, \$1,495 on web, asking \$850. Caskey, 298-6428.

REFRIGERATOR, Amana, white/cream, side-by-side, water in door, ice maker, ~10 yrs. old, ~24-cu. ft., \$150 firm. Samudio, 299-0250.

MURPHY BED, full size, w/side cabinets; oak/glass entertainment unit; photos available, you move, make offers. Williams, 270-3534.

UPRIGHT PIANO, Petrof P118-D1, Czech made, w/bench, excellent condition, \$10,000 new, asking, \$4,500. Hammond, 823-9619.

CHRISTMAS BAZAAR, Nov. 29, 9 a.m.-5 p.m., Nov. 30, 10 a.m.-4 p.m., Cowboy Hall, 1040 Arena Road, Bosque Farms. Cordova, 869-1122.

DUAL-DECK TRICYCLE, pink, Radio Flyer Classic, assembled, mint condition, stored inside, ages 2-6, \$45. Weagley, 385-4059.

SHOES, Adidas Samoa, hot pink/black, 4.5 youth; green converse, size 3 youth (both fit women's 6/6.5); Hollister Jeans, size 1R, 3 pair. Velasquez, 610-3672.

ELECTRIC MOBILE SCOOTER, Rascal 600, all adjustable features, free tires, flat, new \$2,150, asking \$750. Marchi, 346-4220.

PARTS CLEANER, professional grade, Zep DynaClean, w/55-gal. drum, retail >\$1,000, lightly used, asking, \$500 OBO. Brothers, 296-5980.

SKI BOOTS, new, Black Diamond, Quadrant A/T, 25.5, 2013 efficient fit AT liner, lightweight alpine touring, \$200. Kitchings, 274-2026.

FLIGHT JACKETS, 2, military issued, A-2 leather \$250; 45/P Nomex, \$150; both excellent condition. Mills, 450-9767.

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.

UNUSED WOOD, three 4" x 6" x 10', two 6" x 6" x 8', \$10 ea./\$40 all; particle board, 4' x 8' x 3/4", \$15. Garcia, 280-5815.

SIDEBOARD BUFFET TABLE, beautiful, light/medium golden brown, excellent condition, photos available, \$125. de la Fe, 505-903-0717.

SPEAKERS, Definitive Technology, 1 CLR2002 (center), 2 BP2000TL (towers left/right), good condition, \$250. Tucker, 480-208-9528.

BOB STROLLER, w/accessories, \$150 OBO. Verley, 410-9885.

TRANSPORTATION

'96 FORD F150, Zia Edition, short bed, regular cab, 5-spd., PS, PB, AC, full bed liner, 78K miles, \$4,500. Gallegos, 505-363-4399.

'86 ALFA ROMEO SPIDER, Graduate, good interior, paint, engine, >125K miles, \$4,500 OBO. Cordova, 288-7888.

'02 SUBARU FORESTER, AT, AWD, garage kept, extra clean, newer Michelin tires, 85K miles, \$5,000. Hart, 977-1499.

'03 JEEP LIBERTY SPORT, Kahki, V6, 3.7L, 4WD, 4-dr., 91K miles, good condition, \$4,900. Klavetter, 299-4299.

'98 JAGUAR VANDER PLAS, excellent mechanical, mint condition, 88K miles, \$4,200 OBO. Medeiros, 505-280-2601.

'09 FORD F150 STX, V6, loaded, red, clean, 29,458 miles, \$23,000 OBO. Barreras, 604-8671 or 246-8285, ask for Manuel.

'03 AVALANCHE Z66, black, black interior, regular maintenance, low miles, 105K miles, new brakes & shocks, \$9,100. Quingy, 505-489-1234.

'09 LAND ROVER LR2, luxury model, black, tan interior, 82K miles, excellent condition, \$22,000. Collins, 505-249-6982.

'08 TOYOTA MATRIX, 5-spd., white, gray cloth interior, new battery, 36-mpg. average, 72K miles, mostly city driving, excellent condition, \$8,200. Dwyer, 271-1328.

'11 CHEVY SILVERADO LS, 4-in. lift w/mud terrain tires, Rock-Star Rims, alarm, remote start, 37K miles, \$25,000. Castro, 505-250-1445.

'04 PONTIAC GRAND PRIX GTP, supercharged, loaded, heated seats, heads-up display, well maintained, 100K miles, \$7,325. Musgrove, 505-814-4122.

'95 TOYOTA T100 DX, extra cab, 4WD, manual, 156K miles, Raider Cap, needs some work, \$3,300. Rice, 332-1060.

'98 TOYOTA CAMRY, top-of-the-line, white, leather interior, 80K miles. Cronin, 299-5747.

RECREATION

'89 HARLEY SOFTAIL CUSTOM, crimson color, many custom upgrades, 18K original miles, very good condition, \$6,500. Focia, 505-204-6731.

'08 FLIGHT DESIGN CTSW, light sport plane, 1/4 ownership, 600-hrs. TT, cash or loan. Blejwas, 286-9294.

REAL ESTATE

3-BDR. HOME, 2-1/2 remodeled baths, 1,720-sq. ft., 2-car garage, 2-story, fireplace, custom tile, Taylor Ridge, landscaped, magnificent views, MLS#827681, \$215,000. Baca, 792-2221.

3-BDR. HOME, 1-3/4 baths, 1,623-sq. ft., cul-de-sac, Paradise Hills, 4633 Rainbow St, NW, \$175,000. Sedillo, 505-890-2698.

4-BDR. HOME, 3 baths, 3-car garage, 4,000-sq. ft., on open space near Sandia Labs. Dybwad, 270-5888.

4-BDR. HOME, 3 baths, 2,550-sq. ft., semi-custom, Opel Jenkins, brick, Taylor Ranch, \$269,500. Schaller, 897-9484.

WANTED

PROJECTOR, to use for presentations & media. Lovato-Montoya, 342-0043.

FEMALE ROOMMATE, nonsmoker, spacious home, garage, 2 field acres w/barn, Sandia Park. Dalton, 550-3517.

ELECTRIC OR GAS GOLF CART. Madsen, 897-1489, ask for Frank.

ROWING MACHINE, & men's road bike, any working condition. Holliday, 303-845-0939.

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Mileposts

New Mexico photos by Michelle Fleming
 California photos by Dino Youmas



Laura Swiler
20 1441



Wendy Crenshaw
15 420



Cary de la Fe
15 2



Todd Dunivan
15 10593



Anna Martens
15 10667



Janet Montoya
15 5400



Max Saad
15 2216



Sean Stroud
15 5545

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To place your order go to:
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Sandia Science & Technology Park fuels economy with jobs, tax revenue, opportunity for growth

BY Nancy Salem

The \$2.3 billion worth of economic activity generated by the Sandia Science & Technology Park (SS&TP) has produced more than \$89 million in tax revenue for the state of New Mexico and \$12.9 million for the city of Albuquerque in the past 16 years. That's the conclusion of a new report by the Mid-Region Council of Governments (MRCOG).

And jobs associated with the research park, which houses private companies and some Sandia sites in a collaborative environment, have paid out \$3.8 billion in wages, giving the local economy a major boost, the report said.

Albuquerque Mayor Richard Berry announced the report's findings Nov. 19 at Emcore Corp. in the 300-acre master-planned SS&TP established in May 1998. Berry said the park "is a great example of a successful public-private partnership. Its impact on local and regional economic development is a reflection of Albuquerque's collaborative efforts that ultimately result in companies and jobs for our residents. The city of Albuquerque is honored to be an active partner in the SS&TP."

"The Sandia Science & Technology Park has been instrumental in creating economic stability within the region," said Bernalillo County Commissioner Maggie Hart Stebbins. "Through ups and downs in the economy, the park continues to contribute to our nation through innovation and technology, and to our region through increased local investment, area revitalization, and jobs that provide opportunities for our residents. Bernalillo County is proud to be a partner in this effort."

MRCOG assessed the research park's economic impact on the local and state economy from its inception through the end of 2013. The report also measured the number of Albuquerque-area jobs created in the park, economic activity in the community, and wage and salary levels.

"We are fortunate to have the Sandia Science & Technology Park in our community, building on our regional strengths in innovation, ingenuity, and entrepreneurship; providing opportunities for high-wage jobs; and contributing to the goal of long-term economic prosperity," said Dewey Cave, MRCOG's executive director.

"The park plays a critical role in our economy," said



BUSINESS LEGACY — Sherman McCorkle, right, shows a photo of the May 28, 1998, groundbreaking for Emcore Corp., one of the founding tenants in the Sandia Science & Technology Park. Emcore's longtime president and CEO Hong Hou, a former Sandian who is stepping down following the sale of the company's photovoltaics division in the research park, looks on along with Jackie Kerby Moore, the park's executive director and manager of Technology and Economic Development Dept. 1933. McCorkle, former president of Technology Ventures Corp., was instrumental in establishing the park and is now chairman of the board of the SS&TP Development Corp. (Photo by Randy Montoya)

Jackie Kerby Moore, manager of Technology and Economic Development Dept. 1933 and executive director of the SS&TP. "We continue to contribute to an increase in tax revenues and wage impacts despite a tough economy."

Job creation and investment

The report found that the salaries for full-time employees in SS&TP last year averaged \$83,300. The park has been home to 2,470 jobs, including about 1,000 Sandia Labs jobs. The park's activities have created an additional 4,123 indirect jobs throughout the regional economy for a total of 6,593 jobs, according to the report.

"The purpose of the park is to create high-quality, high-wage, long-term jobs," said Sherman McCorkle, chairman of the board of the SS&TP Development Corp. "Our track record has been strong."

Public investment since the park was established has been more than \$89 million, including DOE's contribution for the Master Development Plan, Sandia's man-

agement of the park, land from Albuquerque Public Schools and the New Mexico State Land Office, and landfill cleanup by Bernalillo County, the report said. Other federal, state, and local government entities helped the park by providing grants or matching funds, the report said. For example, the US Economic Development

"The park is a great example of a successful public-private partnership. Its impact on local and regional economic development is a reflection of Albuquerque's collaborative efforts that ultimately result in companies and jobs for our residents. The city of Albuquerque is honored to be an active partner in the SS&TP."

— Albuquerque Mayor Richard Berry



opment Administration provided significant grants for secure fiber-optic communications and security network infrastructure. The city of Albuquerque also contributed to infrastructure improvements in the park.

"The report shows that investment in the park has been more than \$368 million with 75 percent coming from private sources, and that's a tremendous impact," said Rob Leland, VP of Science and Technology Div. 1000 and Sandia's chief technology officer. "Sandia's presence in the park shows its commitment to a continuing contribution to the community. Six Sandia facilities in the park employ more than 1,000 Sandia workers."

New center to boost collaboration

The SS&TP is located next to Sandia and Kirtland Air Force Base, giving park companies the ability to collaborate more easily with scientists and engineers from Sandia and the Air Force Research Laboratory (AFRL). Many park companies supply Sandia and AFRL with goods and services or have commercialized technologies that originated at the federal laboratories.

Sandia announced last month it would pursue a Center for Collaboration and Commercialization to strengthen partnerships, technology transfer, and ties to the community. The center, known as C3, will be located in the SS&TP and support the city of Albuquerque's and the University of New Mexico's Innovation District and Innovate ABQ initiatives.

The park is a partnership of Albuquerque Public Schools, Bernalillo County, the city of Albuquerque, Lockheed Martin Corp., the Mid-Region Council of Governments, the New Mexico congressional delegation, the New Mexico State Land Office, Public Service Company of New Mexico, Sandia National Laboratories, the Sandia Science & Technology Park Development Corp., the state of New Mexico, Technology Ventures Corp., the DOE, Union Development Corp., and the US Economic Development Administration.



THE SANDIA SCIENCE & TECHNOLOGY PARK is a 300-acre business and research center located next to Sandia and Kirtland Air Force Base. Park companies can collaborate more easily with scientists and engineers from Sandia and the Air Force Research Laboratory.

(Photo courtesy of Sandia Science & Technology Park)