Researchers develop what may be world’s smallest robot

By Chris Burroughs

What may be the world’s smallest robot — it “turns on a dime and parks on a nickel” — is being developed by Sandia researchers.

At 1/4 cubic inch and weighing less than an ounce, it is possibly the smallest autonomous untethered robot ever created. Powered by three watch batteries, it rides on track wheels and consists of an 8K ROM processor, temperature sensor, and two motors that drive the wheels. Future enhancements being considered include a miniature camera, microphone, communication device, and chemical micro-sensor.

“This could be the robot of the future,” says Ed Heller (1763), one of the project’s researchers. “It may eventually be capable of performing difficult tasks that are done with much larger robots today — such as locating and disabling land mines or detecting chemical and biological weapons.”

He says it could, for example, scramble through pipes or prowl around buildings looking for chemical plumes or human movement. The robots may be capable of relaying information to a human-manned station and communicating with each other. They will be able to work together in swarms like insects.

The mini-robot has already successfully maneuvered its way through a field of dimes and nickels and travels at about 20 inches a minute. It can sit comfortably on a nickel.

The newest mini-robot research continues work started in Intelligent Systems Sensors & Controls Dept. 15211 by Perry Molley (now 2331), Tom Webber, and others. In 1996 the department unveiled a Mini Autonomous Robot Vehicle (MARV), a one-cubic-inch robot that contained all the necessary power, sensors, computers, and controls on board.

Domenici upbeat on Sandia, budget, future, concerned about energy crisis

By Ken Frazier

Sen. Pete Domenici had only to walk down the aisle of Sandia’s Steve Schiff Auditorium Monday afternoon, Jan. 15, to get his first burst of applause from the overflow crowd of Sandia employees.

Perhaps it was merely relief that he was back on his busy schedule and feeling good after spending the previous Friday night in the hospital for observation. Perhaps it was in gratitude for Domenici’s strong support for Sandia and the national labs. Whatever the reason, it set the tone for an upbeat, at times even enthusiastic, address to the overflow crowd of Sandia employees.

He said he wanted to make sure Sandians were happy in their jobs and that morale is good. He pledged to help working around an eleventh-hour passed legislative measure to have even larger numbers of national labs employees take annual polygraph tests.

He also called for massive new investments in infrastructure at the national labs. He praised Sandia’s future MESA facility for advancing cutting-edge microsystems and microelectronics. He pledged to keep pushing DOE to improve Sandia’s pension plan. He called Sandia’s work in establishing new spin-off companies a wonderful thing to say.

The goal is to increase computing capability to 100 trillion operations per second (100 TeraOPS). By sharing some computing technology developed by Sandia, Celera and Compaq may ultimately reach the “petacruncher” (1,000 TeraOPS) level.

This level of cooperation is necessary to meet the dramatic increases in performance required for emerging genomics and proteomics applications at affordable prices and bring together the capabilities of three leaders in bioinformatics, high-performance computing, and massively parallel systems.

Proteomics is the study of the function, structure, and interactions of proteins in cells, including humans and other organisms.

The next stage of the biotechnology revolution that was started by the Human Genome Program will be fueled by the successful marriage of molecular biology with high-performance computing...
**This & That**

Colorful braggin’ — This issue contains our annual Labs Accomplishments special insert – in full color – summarizing our top technical and administrative accomplishments. It is in effect Sandia’s “annual report” and is well worth your reading time if you want to know what this great laboratory accomplished in FY2000 as usual.

It takes the cooperation of many Sandians to produce this insert, and we thank everyone involved. Lab News writer Bill Murphy did most of the work on our part. If you need a few extra copies to share with your customers or friends, call Iris Aboytes (16426) at 384-2382.

Sandy singing Sandia retiree — Speaking of music, Sandia retiree Sanders (Sandy) Dolce recently brought me a copy of a CD he recorded after some encouragement by his wife, Kay. Sandy, who worked for most of his 27-year Sandia career in the weapons area and retired in 1994, had been writing songs and singing since the early 1950s, and Kay gave him a surprise gift several years ago — arrangements for him to record many of his songs. Sandy and Kay live in Albuquerque, and I’ll bet he’d be glad to tell you more about his 30-song CD, “Sandy Dolce Sings His Songs.”

Jerry says he’s the third family member to own the oxidized little yellow jewel, which he lovingly calls “pigpen.” “The deal is whoever gets it has to keep it running for another year before the next poor family member has their turn,” he says. Brother Ken Hanks (12142) may inherit pigpen next year. Jerry notes the car recently passed the county emissions test on the fourth try after a “minor $426 tune-up,” he adds.

**Retiree deaths**

Dorothea E. Holloman (age 76) ............ Aug. 10
Nelle Satzthule (84) ............... Oct. 12
Gordon C. Gaskill (78) ............... Oct. 16
George M. Baca (87) ................... Oct. 18
Frank A. Maestas (75)............... Oct. 18
George W. Storrer (77) ............. Oct. 18
Thomas J. Bluck (63) ............ Nov. 1
Robert J. Aitken (82) .......... Nov. 9
Charles I. Westmark (71) ........ Nov. 10
Patricia A. Carothers (60) .... Nov. 11
Robert G. Fabian (83) ............ Nov. 13
Joe M. Holcomb (77) ............ Nov. 12
Paul E. Matson (78) .............. Nov. 19
Ricardo Gallegos (78) .......... Nov. 20
I. K. Renfro (81) ................ Nov. 23
Vernon L. Barcafr (85) ........ Nov. 28
Charles J. Caspar (88) .......... Nov. 30
Henry F. Bacon (89) ............ Nov. 23

**Flu shot clinic Feb. 9 for Sandia retirees, spouses, contractors, children**

It’s not too late to get your flu shot! Lovelace will offer flu shots to Sandia retirees, spouses, contractors, and then age nine and older at the Coronado Club on Friday, Feb. 9, from 1 to 4 p.m. The vaccinations are free to Lovelace HMO and TOP members but you must show your ID card to receive the free vaccination. The cost to all others is $10

**Recent Patents**

John Torczyński (1199): Spin Coating Apparatus.
Donald Marshall and Gregory F. Macon (both 1764): Chemical Preconcentrator.

SCN InfoDay shows off classified networking capabilities at Labs

An e-mail message sent from Sandia/California and received at Sandia/New Mexico is not usually an occasion for applause. At the Sandia Classified Network (SCN) InfoDay sessions last month, however, many audience members clapped when they saw the brief message get through.

“Part of the audience was obviously skeptical about how well classified e-mail works,” says Fran Current (8935), project lead for InfoDay planning.

New, improved classified computing

Classified e-mail was just one of the capabilities demonstrated at three SCN InfoDay sessions in December. More than 360 Sandia scientists, engineers, and managers from the New Mexico and California sites had a chance to look at new and improved classified computing services ranging from the Technical Library’s classified online catalog to engineering applications to Classified Web FileShare.

The video- and computer-linked connection between New Mexico and California during SCN InfoDay made use of classified video-conferencing and a secured version of NetMeeting, a popular desktop collaboration tool. Besides the demonstration of how it worked, there was also the fact that we had presenters and audience members participating fully at both sites helped show what can be done in the classified world.

Radiofrequency identification (RFID) technology was on display as a classified user attended the events via NetMeeting, a popular desktop collaboration tool.

Sandia National Laboratories

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Locked Martin

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Unique instrument completes climate study comparison

Lidar automatically profiles water vapor in atmosphere at 120-foot increments

By Nancy Garcia

Imagine being able to watch moist air gather and dissipate in Paradise Hills from Albuquerque, or from Liverpool to Dublin, through night and day, for more than a decade. Computer scientists are receiving a steady high-range data stream from the lower atmosphere thanks to a unique instrument created by Sandia scientists and installed at a DOE weather research station in Oklahoma. The device, recently rigorously compared with other research instruments, measures water vapor up to the upper edge of the troposphere, some eight miles above ground.

Since humidity traps the sun’s warmth and shifts over time, this understanding will assist predictions of the greenhouse effect and global warming. “Water vapor is the primary greenhouse gas,” explains John Goldsmith, Manager of Combustion Chemistry Dept. 8353, who counts this as one of his SAE paper entitled, "A laser spectroscopist by training, John had spent years developing this instrument as a similar technology prior to this project, installed in 1995 after a preceding Sandia/NASA collaboration that focused on developing the necessary technology.”

‘Near research opportunities’
The instrument identifies water vapor by pulsed laser light for billions of a second, then recording the light that is scattered back, some of it slightly shifted in wavelength by the molecules of water and oxygen in the atmosphere. This technique, called Raman lidar, “opened up a lot of near research opportunities,” says instrument mentor Tim Tooman (8120), who estimates he has spent seven months at the Oklahoma site over the last five years. “It’s a very useful thing.”

Dec’s diesel research paper earns SAE honor

Society of Automotive Engineers announces award

John Dec (8362) essentially rewrote textbooks when his diesel engine studies revealed a new conceptual model for how diesel combustion works. Now a research paper that expands on that model and points to promising directions for reducing soot emissions has received a merit award from the Society of Automotive Engineers (SAE) for making an original contribution to the subject of diesel combustion.

John and his co-authors received one of 14 Arch T. Colwell merit awards out of more than 2,160 papers published for SAE meetings in 1999, and will receive a certificate at an honors convocation March 6 in Detroit.

John’s paper was co-authored by Cummins Engine Co. colleagues Patrick Flynn, Russell Durrett, Gary Hunter, Axel zur Loye, and O. C. Akinyemi, and Charles Westbrook, a chemical kinetics modeler at Lawrence Livermore National Laboratory. It is titled “Diesel Combustion: An Integrated View Combining Laser Diagnostics, Chemical Kinetics, and Empirical Validation.”

The paper combines John’s conceptual model of a reformed fuel jet with Westbrook’s chemical-kinetics models to show how the soot-formation zone stabilizes. It then goes on to show how, in this combustion environment, adding oxygenates to the fuel reduces soot formation. Their results explain the main mechanism for the soot reduction that has generally been observed with oxygenated fuels. They are also in very good agreement with experimental data in the literature about the amount of oxygenate required to eliminate soot formation. John says more development of this approach is needed before any commercial application, but the work indicates what directions to take.

Selected over a two-year period by a review committee, from a pool of papers provided by a presentation process, the paper was presented at the SAE International Congress and Exposition in March 1999. In addition to the contributions of co-authors, John says the paper draws on the work of Dennis Siebers (8362), whose research has lead to the development of a scaling law for diesel jet penetration and the rate of air entrainment. This is the ninth recognition John has received from the SAE, including fellowship from the society, two other awards for outstanding papers, and five awards for presentations. The latest presentation award, announced last month, is an “Excellence in Oral Presentation” award for John’s work in 2000 presentation of his SAE paper entitled, “The Effects of Injection Timing and Diluent Addition on Late-Combustion Soot Burnout in a DI Engine Based on Simultaneous Imaging of OH and Soot.”

New fiber-optic classified video system recognized at Pantex plant site

A team of Sandia/Californians and the Pantex Trilogy Office manager were recognized by the U.S. DOE for their efforts in developing and fielding a new fiber-optic classified video system. The system is a product of Sandia’s recent efforts to provide systems engineering solutions in response to Pantex plant needs. It was developed because of the need for close monitoring of critical classified operations under potentially hazardous conditions.

According to Pantex Deputy General Manager Jim Angelo, “The success of this demonstration was exceptionally noteworthy in that it reduced the number of required observers in the operations bay, improved the visual access to the [W88 DOE readiness assessment/nuclear explosive safety study], and provided a playback capability. As a result, the quality of readiness reviews in the future will be greatly enhanced.” Pantex is currently evaluating the use of this system for W56 weapon systems.

The concept for the secure video system, dubbed COVIS, or Classified Operations Video System, was researched and managed by Bill Wilson (2250) and Sandia Trilogy Office manager John Duncan (2252), who also coordinated the safety approval process. Robert Kinzel (8415), formerly 2252’s responsible for technical design, fabrication, and personnel training for the portable system. Additional management oversight was provided by Anton West (2253). All four team members were awarded Individual Performance Awards by Mason & Hangen in recognition of their “personal commitment, dedication, and outstanding performance.”

What is a lidar? It is a remote sensing technology that uses lasers to sense objects or phenomena at a distance. Lidars can be used to measure the concentration of water vapor in the atmosphere. The lidar system used in this study automatically profiles water vapor in the atmosphere at 120-foot increments above ground. The lidar system at the Oklahoma site actually profiles the atmosphere, bracketing regions from just a few feet (as if someone could climb a ladder with rungs 120 feet apart) up to the very top layers of the atmosphere.

Being able to reach the upper levels of the atmosphere is important, because this is where sunlight first encounters climatologically significant quantities of atmospheric water.

Aside from being able to provide valuable data, the lidar has also been subject to three studies that compared water vapor measurement techniques. “At the moment,” says Tim, “we’ve taken essentially every important, fieldable instrument that measures water vapor and compared them to each other.”

Tim and John each spent a week in Oklahoma in December preparing the last of the third study, along with researchers who supported the other instruments and met daily for discussion of scientific issues. In this phase, two more lidaries were used. One was taken aloft on the NASA DC-8 I to study water vapor above and below the aircraft, which was piloted in a column of airspace above the site at night. (When sunlight does not reduce the maximum altitude that can be measured by the Raman lidar, John, a pilot, enjoyed flying along in the cockpit jump seat.)

Multiple simultaneous measurements

The objective was to have the instruments all measuring the same atmosphere at the same time. Tim said, since every instrument has measurement errors and intercomparisons help show how accurate each is.

“In a sense,” he says, “we’re the ones to beat.” The lidar, housed in a revamped cargo container, has been operational about 90 percent of the time and is being improved even further. In fact, this rural setting, every day or so, the voltage would faltter for a few thousands of a second, which used to cause the laser to shut off until power-conditioning units were added.

John wrote the software that runs the instrument and is helping improve software that analyzes the data. Measurements obtained during the Fall Intensive Observation Period will be evaluated over the next couple of years, and DOE has extended the initial 10-year Atmospheric Radiative Monitoring project another 10 years due to the promise and complexity of the overall research. After an interval leading a team on another project, John was excited to get back involved with the lidar and pleased with the way the unique instrument operates itself. Says Tim, “You’d just come and watch it run.”
Domenici upbeat

(Continued from page 1)

Domenici said he intends to run again for another six-year term as US senator in 2002.

Afterward, Labs Director C. Paul Robinson, who introduced Domenici at the colloquium as "one very good friend," said the independentFilipino. "We've had on a terrific colloquium and bear," in "random form."

he himself said it had been "an exciting day," he marveled that when he speaks to "all these serious Sandians" he gets more laughs than from any other audiences.

Some elaborations and additional points:

Budget: "I am proud that we put out a very powerful budget bill, especially for science-based stockpile stewardship," Domenici told the colloquium audience. "We ended up with a very good and energetic budget, the best we've had for Sandia for many years," he added, at the subsequent news conference. "Some people think the best we can hire from the best in America, and we need to make sure they think they are doing important work." Domenici said that he got a standing ovation when he said, "I know a lot about him. He served on my subcommittee. ... I thought he was going to be OK. I do think he is going to be OK. I do think he is going to be OK.

Energy and the world: The poor countries of the world need new sources of energy as well. "The worst people of the world to become free," he said, "but we also want to get them to do things right. He is not an expert on energy, but we are all going to help. Also, he is going to get some wonderfully smart people to work for him. If he's going to get to OK, I already pledged to work with him in every way possible.

The new US energy crisis: "The country is in a serious energy crisis," Domenici said. He described to the audience how Sandia problems in Califor- nia as a crisis in electricity generation and a consequence of too much demand for and reliance on natural gas. The utilities have been rocked by a 9-times increase in the cost of their raw materials.

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Sandia technology part of Raton company’s bid to improve oil, coal extraction, landmine detection

Technology developed by Sandia and a Russian nuclear weapons lab and adapted by a Raton, N.M., company to improve coal mining, oil exploration, and landmine detection has attracted a $20 million investment by Credit Suisse First Boston.

The investment was announced Jan. 15 at a United States Industry Coalition (USIC) news conference and demonstration of the equipment developed by Solar Horizon Inc. at the offices of Technology Ventures Corporation in Albuquerque.

After greeting Solar President and Chairman Larry Stolarczyk with a bear hug, Sen. Pete Domenici, R-N.M., decried the “energy crisis” that just a couple of days later would bring the first of rolling blackouts in California. “We have literally done nothing to head off this crisis,” he said, criticizing the just-ended Clinton Administration, “and we are in big, big trouble.”

The technology refined at Solar Horizon will allow petroleum exploration companies to produce better maps of oil and gas deposits by providing long-vision mapping of underground fractures. The company also plans to commercialize a radar device for satellite long-vision mapping of underground fractures. The radar equipment would fit inside huge continuous mining drums that grind through coal

In response to a question about whether the company is going to have a cleaner environment, Larry Stolarczyk told Sandians and others attending the event, “And if we mine coal cleaner, we’re going to have a cleaner environment. No question about it.”

The adaptation work was performed under the auspices of the Initiatives for Proliferation Prevention program, created in 1994 largely through the efforts of Sen. Pete Domenici, R-N.M., with strong support from Sen. Jeff Bingaman, D-N.M., according to a USIC news release. It finds projects that allow scientists and engineers formerly engaged in the Soviet nuclear weapons program to continue to work in their own country. They work on non–defense-related projects with US counterparts. Solar Horizon worked with scientists and engineers from the Institute for Measuring Systems Research (NIIIS), a Russian nuclear weapons facility located in Nizhny Novgorod, about 460 miles east of Moscow.

Sandia is providing Solar with scientific expertise on the borehole radar and related technology. The radar equipment would fit inside huge continuous mining drums that grind through coal and rock. It would provide feedback to miners operating the equipment, identifying for them, among other things, the rough edges of coal seams, which are often low-grade coal because of higher content of ash and mercury.

“If we mine coal cleaner it’s going to burn cleaner,” Stolarczyk told Sandians and others attending the event, “And if we mine coal cleaner, we’re going to have a cleaner environment. No question about it.”

The IP program was conceived with that concern in mind, he said.

Solar Horizon, which currently employs 17 people in Raton, expects to add about 50 to its payroll by the end of the year and still more in the coming years. The project could eventually add as many as 350 jobs in New Mexico and perhaps twice as many in Russia.

— Howard Kercheval

EMCORE opens expanded New Mexico facility

EMCORE hosted a ribbon-cutting Jan. 19 to mark the opening of its expanded facility in the Sandia Science & Technology Park (SSTP) east of the Kirtland AFB Eubank Gate.

The expansion — adding 36,000 square feet to the existing 50,000-square-foot building — triples the Somerset, N.J., company’s classroom manufacturing capacity. The building houses solar cell, optical component, and networking products.

“The additional classroom capacity is critical for us to serve our growing customer base, and provides an opportunity for EMCORE to continually develop new product technologies for the rapidly increasing global communication markets,” said EMCORE President and CEO Reuben Richards. “I expect this expansion to help us achieve our aggressive product development and production goals for the remainder of the year and beyond.”

The company’s Solar Cell division manufactures advanced triple junction solar cells for satellite applications. The Optical Device division provides the building blocks for high-speed telecom and data communications applications, including the Internet infrastructure.

“EMCORE is one of a handful of strategic industrial partners that we treasure,” says Al Romig, VP for science, technology and partnerships (1000). “The core product of EMCORE’s western division in Albuquerque grew out of technology co-developed at and licensed from Sandia, and we continue to work with them. We’re happy to see that technology in the marketplace, and happy to have EMCORE in the park.”

Jackie Kerby Moore (14004), project manager for development of the park, says EMCORE is an exemplary SS&TP tenant. “Their success as a company is one of our biggest selling points,” she says. “Companies move here to co-locate with other successful businesses, and we’re gratified that EMCORE Optical Devices chose to build its new facility in the park.”

The newly expanded facility will house 285 employees, and company officials expect to add employees this year.

Consortium to develop Cold Spray™ technology

Sandia and 10 companies have formed a consortium and signed a cooperative research and development agreement (CRADA) to develop and commercialize Cold Spray™ technology. The consortium includes Alcoa, ASB Industries, DaimlerChrysler, Forton Technologies, Inc., The Jacobs Chuck Manufacturing Company, Johnson Manufacturing, Ktech Corporation, Pratt & Whitney, Praxair, and Siemens/Westinghouse. The first experiments performed for the consortium were conducted shortly before the holidays.

The group expects to complete Cold Spray development activities in three years, enabling broad commercial use of the technology. Cold Spray™ is a rapidly emerging technology in which metal or composite powders are accelerated to supersonic velocities in a stream of compressed gas, usually helium, and used to coat a substrate by plastic deformation and bonding.

“Cold Spray™ is an especially exciting technology because of its fundamental simplicity,” says Rich Næsler (1833). “It allows us, for the first time, to fabricate dense, oxide-free deposits of ductile metals at high rates in air with equipment no more complicated than a nozzle and compressed gas.”

Unlike thermal spray coatings, where the coating material undergoes melting, Cold Spray powders do not change phase or state during deposition and therefore offer high deposition rates, very low oxide content, minimal heat input to the substrate, and faster and more efficient coatings without masking. Coatings also can be applied to many materials that cannot tolerate the higher temperatures of thermal sprays.

When developed and commercialized, the Cold Spray technology is expected to benefit industries as diverse as aerospace, petrochemicals, automotive, paper and printing, electronics, computers, biomedical, and primary metals, and have a number of applications ranging from electronic components to satellite structures.

“These industries are looking closely at cold spray as an economical means to fabricate, repair, and protect their expensive components,” says Rich. “And they add, with a chuckle, “Cold spray was originally developed in the former Soviet Union; and where else but Siberia.”

Job Shadow Day coming up

JOB SHADOW DAY — Children and guests of Sandians will be able to “shadow” their sponsors at work on Groundhog Day, Feb. 2. Here Ryan Cook (right), a Cibola High School senior, shadows Rusty Escapule (15414) during National Shadow Day last year. More information about this year’s event can be obtained by calling Amy Tapia (12650) at 250-1111. (Photo by Randy Montoya)
Endeavour

(Continued from back page)

advantage.

The next DTO-261 test will involve moving the P6 truss to its final ISS destination, out to the end of the 300-foot truss assembly. NASA officials plan to use LDRI during that operation and have expressed an interest in LDRI for future navigation, guidance, docking, and inspection applications.

Sandians at Johnson Space Center at various times during the Endeavour mission included: Bob, Steve Lebien, Ed Hoover, T.J. Cook, Colin Smithpeter (both 2618), and Mark Heying (15251).

“It was like being in a beehive,” says Bob. “It’s a big place with a lot of people doing diverse things in a highly structured manner. There’s a fevered pitch all the time, with hundreds of radio loops to listen in on. There’s a new interruption every 30 seconds. A lot more care and feeding was involved in making the mission a success than we anticipated.”

Other people directly contributed include Dave Armitstead (2664), Jack Martinez (5815), Ron Benau (9117), Irene Bentz, Kate Oldberg (both 5711), Tim Dubay (5712), Tom Casaus (2618), Ken Reaves (9117), Sid Gutierrez (5932), John Sacks (2612), Marion Scott (1707), Howard Arris (14172), Cory Osnesen (2346), Ed Jones (ret.), and Frank McMullan (contractor).

Superdupercomputer

(Continued from page 1)

The goal is to increase computing capability to 100 trillion operations per second (100 TeraOPS).

The strength of Sandia’s Laser Dynamic Range Imager (LDRI) for structural vibration measurement, says Bob Nellums (2618), is its ability to measure “near-far” movements very precisely, as slight as fractions of an inch, and to take such measurements many times per second.

“2-D cameras can measure cross-axis movement,” he says. “But something vibrating in complex, three-dimensional fashion is difficult to measure remotely.”

The LDRI works by illuminating a scene with wide-angle pulses of laser light many times per second, then measuring the intensities of light that reflect off objects in the scene. Light reflected by an object that is close to the LDRI will return to the system’s camera billions of a second sooner than light reflected by an object that is farther away.

Meanwhile, the camera’s eye is blinking many times per second as well, collecting images of the scene while the eye is open, while it’s squinting, while it’s closed, and while it’s squinting again. Surface of the scene that reflected light back to the system while the eye is near fully open appear bright; surfaces closer to or farther away from the camera appear more dim because the eye was squinting or near-closed when the reflected light returned. The result is an intensity image containing many light and dark bands that contain information about the light’s time of flight to and back from each surface.

At least four such intensity images of the scene are collected while precisely varying the timing of the laser pulses and the blinking rate of the camera’s eye. By mathematically comparing information about how the intensity of each pixel varies in the four images, the LDRI computes distance to each pixel to create a 3D range image.

Other laser radar systems transmit a pinpoint of light that is mechanically scanned across the scene and imaged pixel by pixel.

The “scannerless” technology employed in the LDRI takes in the whole scene simultaneously, which allows many more images to be collected — as many as 7–12 3D range images per second, fast enough to analyze vibration frequencies in large structures such as the space station — with resolutions down to 1/100th of an inch.

RANGE IMAGES taken with Sandia’s Laser Dynamic Range Imager, looking up the space station’s P6 mast from the Endeavour’s cargo hold, with the solar array panels extending left and right. In the left image, white represents 50 feet away and black represents 110 feet away from the camera. In the right image, each cycle from full black to full white represents 3.5 feet of range. (See “Tricks of light... ” below.)

Tricks of light, timing allow LDRI to measure vibes in 3D

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NASA sought solutions in Sandia range imager during December Endeavour mission

Flexibility an advantage

“One of our goals was to impress people with the usefulness of the LDRI as a general-purpose tool for future missions,” says Bob. “I think we showed during the unplanned parts of the experiment that the flexibility of our system is an advantage.”

(Continued on page 6)

Coronado Club

Jan. 26 — Dining, 6-9 p.m.; dancing, 7-11 p.m. Music by Midnight Magic.

Jan. 28 — Super Bowl Sunday. Tailgate buffet, 1-4 p.m. Enjoy the game on big screen TV.

Jan. 31 — Icebreaker. Meet the Coronado Club staff. Free snacks, beer, & wine, 5-7 p.m.

Sandia News Briefs

Sandian Randy Longenbaugh honored as Civilian of the Quarter while on loan to the Air Force

Randy Longenbaugh (6524) was recently honored as Civilian of the Quarter for the Technical Treaty Monitoring Division of the Air Force Technical Applications Center (AFTAC). Randy is currently on a two-year loan to AFTAC/TTA, the Atmosphere and Space Division of the Technical Treaty Monitoring Division, located at Patrick AFB in Florida. “Since starting this assignment in August, 1999,” says Bill Richard, Manager of Mission Analysis and Simulation Dept. 6524, “Randy has provided Sandia’s unique expertise and capabilities to AFTAC by performing analyses of Nuclear Detonation Detection System data originating from sensors developed at Sandia and Los Alamos national laboratories. In addition, he has been appointed as a Technical Alert Officer by AFTAC, a position currently held by only one other civilian.”

Send potential Sandia News Briefs to Janet Carpenter, Dept. 12640, jacarpe@sandia.gov, MS 0165, fax 844-0645.