Modern weapons technologies often keep members of the military out of harm’s way by allowing them to perform missions from a distance.Researchers at the Department of Energy’s Oak Ridge National Laboratory are helping the military play defense from a distance, as well.

Dan Archer and Thomas Karnowski, along with their team of scientists, are working with the Navy and the Woods Hole Oceanographic Institution to continue the development of unmanned, autonomous underwater vehicles with sensors that can scan areas, detect anomalies and differentiate between objects—like a wrench and a hammer versus an explosive mine.

“It’s a difficult problem because if you have a wrench and a hammer—fine—you can distinguish those,” Archer said. “But throw a bunch of other stuff on the table and then try to find the tools amongst the clutter and distinguish them from one another.”

Underwater machine vision can use both visual and sonar data. However, in depths greater than 15 feet, water filters the visible light spectrum, making a red object appear gray. Combine that with sand, salt, seaweed, current and bubbles, and accurate perception becomes difficult.

As a result, scientists are emphasizing the collection and processing of sonar data. During a mission, vehicles may collect many hours of data that will be analyzed by humans looking at each frame searching for an anomaly. The idea is to automate this process using machine vision embedded in efficient computational resources.

Supported by laboratory funding in collaboration with an Office of Naval Research-funded project, Karnowski analyzes the visual and sonar data and is developing an algorithm to make data analysis a more efficient process. With an efficient algorithm, the unmanned underwater vehicle can use the algorithm to understand what is being seen, eliminating the need for human workers doing their best to sift through hours of data.

“That’s the whole idea,” Archer said. “How do we apply our scientific expertise developed in other areas to enhance national security in an automated fashion that will become more efficient and cost less over time? All the science that goes into that is the key.”

However, these sensors don’t stop at just recognizing different objects—the goal is to understand them. The next step is a merging of the sensor analysis with the controls of the vehicle.

Using the data from the multiple sensors (like depth, speed and heading), the onboard processors can make sense of all the information at one time in order to lead more efficient missions and relay the information back to whoever is looking at the data.

The wars and defense of the future are not human oriented, but robotics oriented. For robots to perform their mission of safety and security they have to have sensors embedded and the work at ORNL will provide those sensors. With safety at the forefront of robotics design, these are the droids we are looking for.

–Dylan Platz

An unmanned, autonomous underwater vehicle surveys a glacier and remote fjord in western Greenland. Photo: Woods Hole Oceanographic Institution (A.Kukulya).
A highlight of November’s annual Veterans Day ceremony at ORNL was a tribute to ORNL retiree Ernest Shepherd. Ernest — who turns 90 Feb. 10, attended the event wearing an Army uniform similar to one he wore in 1944 when he served in Europe during World War II. He was honored with a video tribute for his service.

Working as a medic in England during the Allied invasion of Normandy, Ernest treated Allied soldiers wounded during the invasion. Later that year, his unit went to Belgium. Working in a hospital there, he survived a German V-bomb explosion.

“It blew out all the windows in that whole building,” said Ernest, who was located on the second floor about 300 feet from where the bomb exploded. “It killed 29 people and many more were injured, including myself.”

Despite being cut in the face with shrapnel and flying glass, Ernest still sought to help others in the hospital amidst the chaos.

“There were between 12 to 15 of our hospital personnel – some of whom I knew – who were killed immediately,” Ernest recalled. “There was one major who was the medical director – someone who I really liked – who also got killed. It was a tough time.”

Ernest eventually recovered from his wounds and returned to the front lines during early 1945. He helped treat soldiers wounded during the Battle of the Bulge in Belgium. His unit was part of the Allied forces advancing toward Germany during the winter and spring. One day in April, Ernest was fortunate enough to meet up with his brother, Henry, who was driving a tank.

“Some tanks were passing by and suddenly Henry’s head popped out from one of the tanks,” Ernest said. “Who would have thought that thousands of miles from East Tennessee we would have met up like that?”

Ernest worked 26 years as a carpenter at ORNL. He and his wife, Armistine, live in Knoxville and will celebrate their 65th anniversary April 27. His daughter, Susan Horn, works in ORNL’s Business Services Directorate. His son, David, is an electrical inspector for the city of Knoxville.

Ernest has been a constant attendee at ORNL Veterans Day activities during recent years. He appreciates people hearing stories about his experiences during the war and his expressions of love for his country.

“The war was tough and I saw a lot of suffering and death, but I’m proud of what I was able to do over there almost 70 years ago,” Ernest said. “As a medic, I was able to help people. I did my duty for my country at a time when it was in need.”

Fred Strohl

The Coalition of Oak Ridge Retired Employees (CORRE) has added five new board members for 2014. They are Shirley Cates, Joe McGrory, Ross Toedte, Mary Jane White and Dave Whitehead. Remaining on the board are Mike Bradshaw, Steve Cates, Ken Moore, Dwight Morrow, Pete Peterson, Dave Reichle, Steve Stow, Mike Willard and Bob Worrell.

Board officers for 2014 are President Dave Mason; Vice Presidents Charlene Edwards, Bob Hightower and Garry Whitley; Secretary/Treasurer Mary Helen Rose; Communications Director Judy Kibbe and Past President Dub Shults. Former board members whose terms ended in 2013 are Carl Burtis, Phyllis Green, Jim Hackworth and Ron Honeycutt.

CORRE is in the process of replacing its website with one that is more efficient, more user-friendly and less expensive. The web address remains unchanged: www.corre.info. Suggestions are always welcome.

CORRE adds 5 new board members
Van Berkel earns top science, technology honor at Awards Night

Gary J. Van Berkel of ORNL’s Chemical Sciences Division earned the ORNL Director’s Award for Outstanding Individual Accomplishment in Science and Technology during the Nov. 15 ORNL Awards Night event in Knoxville.

The award recognizes Van Berkel’s sustained leadership and innovation in the development of disruptive sampling systems for mass spectrometry, resulting in multiple commercial licenses and new product offerings. He was earlier named ORNL’s Inventor of the Year.

David Fowler of ORNL’s Energy and Environmental Sciences Directorate earned the Director’s Award for Outstanding Individual Accomplishment in Laboratory Operations. Fowler was honored for recent accomplishments that exceeded normal performance expectations and positively advanced ORNL’s mission. He also won the Excellence in Operations category.

Donald Cross of ORNL’s Computing and Computational Sciences Directorate earned the Director’s Award for Outstanding Individual Accomplishment in Community Engagement. Cross provided outstanding leadership and selfless dedication in community service through the mentoring of special needs children and adults in a wide variety of organizations. He also won the award for Exceptional Community Engagement by an Individual.

A team composed primarily of members of ORNL’s Energy and Environmental Sciences Directorate earned the Director’s Award for Outstanding Team Accomplishment. The 12-person team, which also won the Scientific Research category, was recognized for groundbreaking research in biotic and abiotic mechanisms of mercury methylation in the environment, leading to high-impact publications in Science and Geoscience.

Members of the team were Alexander Johs, Mircea Podar, Craig C. Brandt, Jerry M. Parks, Xianping Lisa Yin, Dwayne A. Elias, Jeremy C. Smith, Baohua Gu, Carrie L. Miller, Scott C. Brooks, Steven D. Brown and Liyuan Lang. – Fred Strohl

Icenhour named interim ALD for Nuclear Science & Engineering

Alan Icenhour has been appointed Associate Laboratory Director of the Nuclear Science and Engineering Directorate. He replaces Jeff Binder, who moved to the University of Illinois to direct that institution’s Applied Research Institute.

Icenhour has more than 25 years’ experience with the nuclear fuel cycle, including reactor and nuclear facility operations, enrichment technology, radiochemical processing, nuclear fuels, isotope production, radioactive waste management and nuclear security. Currently director of the Nuclear Security & Isotope Technology Division, Alan has held a number of management positions relating to the Laboratory’s nuclear engineering portfolio.

He received his bachelor’s degree in nuclear engineering from North Carolina State University and his master’s and doctorate in nuclear engineering from the University of Tennessee.

John Begovich was named interim director of the Nuclear Security & Isotope Technology Division while Icenhour serves as interim ALD. – Fred Strohl

Club ORNL events

Get the details and latest news online via https://info.ornl.gov/sites/clubornl. Request an XCAMS account, which will allow you to participate in these events or contact Lara James at 865-576-3753 or jamesla@ornl.gov.
December 2013

35 years: Ranell W. Lane, Nuclear & Radiological Protection; James W. Terry, Environmental Sciences; Rebecca A. Fortner, Chemical Sciences; Philip C. Arwood, Information Technology Services

30 years: Dwight A. Clayton, Electrical & Electronics Systems Research; Tracy L. Rollins, Facilities Management Services; Cecil Albert Carmichael Jr., Materials Science and Technology; Sherry E. Williams, Environmental Protection & Waste Systems; David Howard Cook, Research Reactors; Gary H. Henkel, Office of Integrated Performance Management; George Ostrouchov, Computer Science and Mathematics


20 years: John S. Hsu, Electrical & Electronics Systems Research; S. Kaye Colyer, Human Resources Dir.; Dale Patrick Kaiser, David B. Watson, and Mark S. Bevelhimer, Environmental Sciences; Leslie C. Wilkerson, Laboratory Protection; Angela Gayle Shillings, Acquisition Management Services

January 2014

40 years: Michael J. Cole, Fusion & Materials for Nuclear Systems
35 years: David Russell Trotter, Research Accelerator; Kat W. Eldridge, Nuclear Security & Isotope Technology
30 years: John E. Richmond, Nuclear & Radiological Protection; Charles Edwin Banks, Utilities; Ron G. Maples, Instrument and Source; Regis S. Loffman, Environmental Protection & Waste Systems; Peggy C. Anderson, Office of Integrated Performance Management; Virginia H. Dale, Environmental Sciences; Chris Lindsley, Computational Sciences & Engineering; James L. Davidson, Logistical Services; David F. Williams, Nuclear Security & Isotope Technology


20 years: Kimberly K. Anderson and Mia D. Prater, Nuclear Security & Isotope Technology; Jeffery Lee Morris, Safety Services; James Parfitt, Nonreactor Nuclear Facilities; Lora Wolfe, Computer Science and Mathematics

February 2014

40 years: Joe D. McAmis, Utilities; Christopher Owen Stevens, Materials Science and Technology
35 years: Robert M. Wham, Nuclear Security & Isotope Technology; David D. Drake, Nonreactor Nuclear Facilities
30 years: Greg A. Irby, Utilities; Kevin Lyn Rogers, Research Reactors; Curtis William Ayers, Electrical & Electronics Systems Research; Patricia W. Garland, Energy & Transportation Science; Lawrence Paul MacIntyre, Computational Sciences & Engineering; Cynthia Manley, Information Technology Services

25 years: E. B. Golden Jr., Laboratory Protection; David G. Edds, Safety Services; C. Denise McNelly, Office of Integrated Performance Management; Bill K. Needham Jr., Utilities; Chris Luck, Research Accelerator; Kenneth E. McNabb, Fabrication, Hoisting & Rigging; Laura Chavez-Becker and Michael A. Miller, Information Technology Services

20 years: Timothy E. Valentine, Reactor & Nuclear Systems; Mary Jean Harrison, Utilities; Roger J. Weaver and Tim Alan Raley, Nonreactor Nuclear Facilities

Join the Friends of ORNL

Friends of ORNL (FORNL) is a non-profit organization that provides members with a way to keep in touch with co-workers, retirees and current ORNL activities. Luncheon lecture meetings are held at 11 a.m. the second Tuesday of each month. Membership is open to current and former ORNL employees, as well as any person or organization with an interest in ORNL and its programs. Dues are $20 per year and $200 for a life membership. Contact Chuck Coutant at ccoustant3@comcast.net for information.
Liane B. Russell Fellowship established

ORNL has established a research award in the name of its most acclaimed woman scientist.

The Liane B. Russell Distinguished Early Career Fellowship is intended to attract a diverse workforce of scientists and engineers who have demonstrated outstanding scientific ability and research interests that align with DOE and ORNL research missions.

The competitive, three-year fellowship is aimed toward establishing long-term research careers at ORNL. The fellowships will be available to outstanding scientists and engineers who have received their doctorate degrees within the past seven years, with emphasis given to attracting women and minority candidates.

“We’re privileged to have the legacy of someone as scientifically accomplished and socially conscious as Liane Russell to associate with these grants,” said ORNL Director Thom Mason.

With her husband, the late William L. Russell, Liane Russell led a research program that charted significant advances in the field of mammalian genetics and mutagenesis. Shortly after World War II, the Russells moved from the Jackson Laboratory in Maine to establish ORNL’s famed Mouse House, a colony of mutant mice used in genetics research.

“In my life, I was very fortunate in being given opportunities to pursue my own ideas in exciting research areas,” Liane said. “But this is, sadly, not the case for many young women hoping for scientific careers and ending up in merely supporting roles, perhaps doing only routine jobs. So, I’m particularly honored to have my name attached to this program.”

Former UT-Battelle Scholar living his dream in California

When Lenoir City High School senior Wes Alvaro earned the 2004 UT-Battelle Scholarship to the University of Tennessee, he dreamed of a career in computer science.

Ten years later, Wes’ dream has come true as he today works for Google in providing support to its customer service group.

“My desire was strengthened while in college and working as an ORNL intern,” Wes said recently while home for the holidays in Lenoir City.

Wes earned bachelor’s and master’s degrees in computer science from UT and was working on his doctorate when he decided to accept a job offer from Google almost three years ago, placing him in his current position in the San Francisco area.

“I felt like it was time for a change and the Google opportunity was the type of opportunity I was seeking,” Wes said.

Wes develops and services tools for Google’s customer service group, which is considered a crucial aspect of the Google operation.

“Google takes its customers’ concerns quite seriously and my job is to help the customer service reps with the support they need for whatever the issue,” said Wes, who works with a group of 15. “Over these past few years, we’ve developed different tools to help the process along.”

Wes and his wife, Sarah, a Nashville native and also a UT grad, have found life somewhat different from what they were used to growing up in Tennessee.

“There are more people and more diversity,” Wes said. “I would say life is not as different from what we thought it might be, but there’s still a lot of stuff going on. The heavy traffic we have to deal with can be challenging.”

Wes and Sarah are able to visit Tennessee several times a year. Wes’ mother, Deb, works in ORNL’s Information Technology Services Division.

“We enjoy returning to Tennessee, but California is our home,” Wes said. “It is a perfect area for the work I do.”
Sixty years ago this quarter

**Take from ORNL “The News” for Winter of 1954**

- As shown on the backdrop page, in 1943 an ordinary-seeming pen-light was used to carry the first sample of plutonium produced at Oak Ridge National Laboratory to the University of Chicago for research studies. Though tiny in size, unusual precautions were taken to safeguard the rare metal, and the pen-light container was used on the principle that its complete harmlessness would deceive any spy who might attempt to employ the message andloyd his purveyors. Research in this no such incident occurred, and the pen-light is now another souvenier of the pioneer days of the atomic energy project.

**Local Men Speak At ASM Meetings**

Dr. J. O. Barnett, at the ORNL Metallurgy Division, will be the speaker at a meeting to be held on Thursday, December 12, in the union hall. He will discuss the development of the graphite reactor as the principal source of radioisotopes and details on the processing and shipping of radioisotopes in the US.

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**Applications Pouring**

Applications are being made in the ORNL Recreation Office for tickets to the Carnegie children’s Christmas party, scheduled for Monday and Tuesday, December 21 and 22. These parties will be held at 10:00 AM and 1:00 PM on both days at the Oak Ridge High School auditorium. An additional group party for children in English Valley will be held on Tuesday, December 21, at 11:00 AM. In order to be eligible to attend, children must be between 6 and 12 years of age and have been ORNL parents or engaged in the defense program. The parties are for the children to enjoy themselves, if possible, or in the company of an older child. If parents believe that their children have

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**Keim, McNally Featured At ACS Conclave**

Dr. C. P. Keim, director of the Oak Ridge National Laboratory, will present a paper at the Regional Conclave of the American Chemical Society in New Orleans, which is now in session.

**K. D. Nichols Makes ‘Orientation’ Visit To Local Plants**

K. D. Nichols, general manager of the U.S. Atomic Energy Commission, paid a recent visit to Oak Ridge this week as part of a nation-wide schedule, which is to include all the major AEC installations in the country.

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**Welding Society Meets on Monday**

The Northern Tennessee Section of the American Welding Society will hold a dinner and technical meeting on Monday, December 14, at the N & W Cafeteria, Atascadero Drive, will be served at 6:45 PM. The speaker will be the secretary for the evening. Tickets may be obtained from G. M. Stoughton, Building 3600, Extension 383.

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**Dr. Householder: Address AIChE**

Dr. A. B. Householder, director of the Oak Ridge National Laboratory Mathematics Project, will be invited to address a symposium on “Use of Computing Machines in Chemical Engineering,” which will be held in conjunction with the forty-sixth annual meeting of the American Institute of Chemical Engineers in St. Louis, Mo., next week, December 13-15. Dr. Householder will present a paper entitled “Preparation of Problems for Digital Computers.”

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**NEGATIVE REPORT**

Dr. Walter C. Alvarez, in his column in The Yearbook, recently discussed the controversy over whether some of the fossils should be treated with radioactive methods. Dr. Alvarez reports that, because some unknown cells in the fossil do not contribute the activation strongly enough, this radiometric technique has not proved so useful as doctors had hoped.

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Gov. Bill Haslam held a series of public events in East Tennessee in December, and his comments related to education are worth highlighting.

Educational opportunities offered to Tennessee students at all levels — and the resulting improvements in academic achievement — directly affect our ability to grow globally competitive businesses here, to provide opportunities for our kids and grandkids, and to recruit top talent to Tennessee. The governor, speaking Dec. 13 to 400 community leaders at the East Tennessee Economic Council’s annual meeting, emphasized the importance of strong support for STEM fields — science, technology, engineering and math.

“The STEM disciplines that so many of you are a part of in this room, that’s not overhyped,” the governor told ETEC members. “That’s where the demand is.”

There’s demand because there’s great opportunity.

New manufacturing techniques promise revolutionary change in major industries, including reconsideration of whether production really needs to reside overseas.

Some techniques, such as larger-scale additive manufacturing, are being pioneered with companies at Oak Ridge National Laboratory, and ALCOA’s edge in technology and innovation is fueling a $275 million expansion to meet automotive demand for high-strength lightweight aluminum. In the energy sector, the Tennessee Valley Authority offers a test bed for innovation across a broad energy portfolio. Internationally, nuclear security is a forefront issue in which B&W Y-12 and the Y-12 National Security Complex play a key role, and in numerous other fields — medical technology, high-performance computing, logistics and more — major Tennessee employers have established global reputations for excellence.

Recent progress in Tennessee’s educational system should be heralded. U.S. Education Secretary Arne Duncan hailed Tennessee for its gains in the National Assessment of Educational Progress when results were announced in November. Haslam, in his remarks at ETEC’s annual meeting, was quick to point out that Tennessee’s rise from near the bottom of 50-state rankings into the 30s still leaves a long road to the academic Top 10. Strong STEM programs should be central to Tennessee’s path forward.

STEM education isn’t limited to technical training or advanced equations. The ability to think critically, identify creative solutions and collaborate with colleagues is central to any well-rounded STEM program, and those traits are essential if we hope to attract and retain business investment in our state.

That’s why each of our companies supports STEM programs for students from elementary through college age, as well as internships, competitions and scholarships. The FIRST Robotics Competition, sponsored in Tennessee by companies including UT-Battelle, TVA and Alcoa, has grown rapidly by offering high school teams hands-on experience developing and marketing technology. Through the TVA Partners in Education program, employees work with schools throughout the region to engage students in STEM learning activities such as math and science competitions, plant visits, robotics and outdoor environmental projects. The governor’s audience at ETEC is pushing STEM into smaller and rural schools through the Lab-in-a-Box program.

And our companies have joined Tennessee in developing the Tennessee STEM Innovation Network, with regional hubs and platform schools that connect educators with scientists and students with workforce mentors.

The world is shrinking. We’re competing not only with neighboring states, but with a world hungry for the economic success we in the U.S. risk taking for granted.

Leaders of industry, government, schools and communities must make sure quality STEM opportunities are a part of any well-rounded education effort, providing students with essential skills and, most importantly, fueling their curiosity and broadening their opportunities.

Competition is growing. If we work together, we’ll win.

Thom Mason
ORNL's Sustainable Campus Initiative has won three awards recently, including one that was presented at the White House.

The GreenGov Presidential Award was presented to ORNL for work with Indian River State College to create a sustainable campus and for the key role in the development of an electric vehicle-charging corridor across the state of Tennessee.

Johnny Moore, DOE site manager at ORNL, along with Melissa Lapsa and Teresa Nichols of the Energy Science and Transportation Division, accepted this award during the White House ceremony.

ORNL also earned DOE’s Federal Energy Management Program’s 2013 Federal and Water Management Award for exceptional accomplishments in energy, water and fleet management in the federal sector.

An additional honor was the Tennessee Chamber of Commerce and Industry Outstanding Achievement Award for Air Quality. This award recognizes ORNL's sustainable campus initiative holistic approach to the Lab's sustainable efforts such as greenhouse gas management and operational Biomass Steam Plant.