

SCIENCE

ORNL technology could mean improved prosthesis fitting, design

Soldiers returning from war who have lost a leg could lead a more active lifestyle with the help of a technology being developed by ORNL researchers.

ORNL biomedical engineers Boyd Evans and John Mueller are perfecting a portable, wearable system to measure walking patterns that can be applied to real-world activities in a variety of settings.

“For example, if an amputee soldier wants to train and return to active duty, we need to understand how he or she would fare on a military training course, which you can’t measure in a laboratory setting,” said Evans, who leads the project.

Evans and Mueller are collaborating with Center for the Intrepid at Brooke Army Medical Center to improve prosthesis performance for young soldiers. Wounded soldiers tend to be between ages 18-25, need a prosthetic that will last a long time and are active, so they are putting more stress on their healthy limb.

“Lower leg amputees in the military population are typically young, athletic and, besides their injuries, in top physical condition,” Mueller said. “For this

reason, most military patients want to remain active and in some cases return to active military duty. We are looking at how we can improve prosthesis fit, alignment and function.”

Additionally, Evans and Mueller want to develop a gait analysis system that can be utilized outside of a confined laboratory setting. Typically, motion-capture gait analysis is performed in a large, multimillion dollar laboratory using controlled

conditions and limited activities.


“The goal of our research is to use the recent advances made in video game technology to develop inexpensive tools for amputee rehabilitation,” Evans said. “This will allow advanced rehabilitation techniques to both be used in smaller clinics and to be taken outside the clinic.”

To monitor the motion and force of walking patterns, Evans and Mueller are collaborating with BAMC to utilize inertial measurement units, or IMUs, and other sensors that can be strapped onto segments of a subject’s leg. The data is then used to calculate the motions and forces associated with specific joints.

To test the effectiveness of IMUs, Evans and Mueller use a robot leg that has been programmed with data from a walking person. Evans and Mueller plan on going to the Gait and

Motion Analysis Laboratory at Center for the Intrepid in a few months to test their system on a human subject with a prosthetic and healthy leg.

“We have high expectations for this system once it is fully developed,” Mueller said. “We think it will improve the prosthetic fitting and aligning process and help lower the risk of chronic joint disease in this group of wounded warriors.”

—Emma Macmillan 



ORNL biomedical engineers Boyd Evans and John Mueller are working to improve prosthetic fitting and design for young military amputees. (Photo: Jason Richards)

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ORNL retiree Tim Ensminger is a 'cool' teacher



Rockwood Middle School seventh graders Zoie Hill, left, and Gracie Poland, center, demonstrate their Pop-A-Nater project to Tim Ensminger during enrichment class. (Photo: Curtis Boles)

Tim Ensminger is a prime example of someone who retired, got into education and has become what one of his seventh grade students describes as “a cool teacher.”

After working in environmental assessment and analysis at ORNL for 28 years and spending some early retirement time helping to remodel houses, Tim got the bug to go into teaching.

Tim teaches six general science classes and an enrichment class each day at Rockwood Middle School.

“I love science and I love kids, so it seemed natural to become a teacher at a time when schools were looking for people with science backgrounds,” Tim said following the end of one of the seven classes he teaches each day.

Tim’s wife, Linda, and many of his friends were surprised when he decided to go into teaching.

“She thought I had been hit in the head with a board when I first told her, but she’s very supportive now,” Tim said.

“Specifically, I wanted to teach on the middle school level because that is still an impressionable age, and I think I can make a difference.”

During a mid-January visit to Tim’s enrichment class, several students were demonstrating compound machine projects they had built.

Watching two girls demonstrate their Pop-a-Nater Machine — using a small toy car with a pin representing a wedge on the front traveling down a ramp before hitting a balloon and popping it — the students are mesmerized as the experiment is performed over and over.

“We went almost 10 minutes over the allotted time period for the class — it is lunch time — and these students are still watching the demonstration and not even thinking about lunch until I look at the clock and see we are late,” Tim said. “Seeing this means so much to me and is why this is what I’m supposed to be doing.”

Tim obtained a Tennessee teaching certificate more than four decades ago but had never put it to use.

“At the time, I was just trying to keep my options open,” Tim said.

Tim has a basic philosophy he tries to convey to his students.

“I grew up in a small town (Niota in McMinn County) and never thought I would end up working at a world renowned national laboratory,” said Tim. He also served two years in the Army in the Vietnam War, seeing more than his share of combat experiences. “I tell them that if I could do all that, then they can be successful, too.” —Fred Strohl 🌱

“I love science
and
I love kids.”

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Morgan McCorkle

Editor

(865)574-7308

mccorkleml@ornl.gov

Emma Macmillan

Writer

Cindy Johnson

Design and Layout



We’re changing Reporter to either an email or online format. Tell us which format you prefer and the type of content you want to read. Send your feedback to ornlreporter@ornl.gov.

Service Anniversaries

January

50 years: James William Roddy, Global Nuclear Security Technology

40 years: Auzzie Bee Freeman, Logistical Services Division

35 years: Bobby R. Whitus, Measurement Science & Systems Engineering; Thomas J. McLaughlin, Research Accelerator; Earnestine Sloan, Human Resources & Communications Dir.; Dennis E. Boyd, Logistical Services; Raymond W. Tucker, Jr., Measurement Science & Systems Engineering; Gregory P. Zimmerman, Environmental Sciences; Steve H. Overbury, Chemical Sciences

30 years: Lynn M. Smalley, Materials Science & Technology

25 years: George W. Hill, Information Technology Services; Anthony Vito Palumbo, Biosciences; Gyula Eres, Materials Science & Technology; Cindy L. Mayfield, Human Resources & Communications Dir.; Natalie L. Crippen, Oak Ridge Counterintelligence; Teresa J. Cochran, Quality Systems & Services

20 years: Thomas L. Wilson, Jr., Reactor & Nuclear Systems; John Benjamin Czachowski, EESD Safety & Business Operations; Pamela C. Rohde, Laboratory Protection; Kathy L. Johnson, Measurement Science & Systems Engineering; Ronald Allen Crone, Research Reactors; Kathy Davidson and Marci W. Howard, Business Services Dir.; Howard H. Oberholtzer, Jr., Research Reactors; Michael Joe Mitchell, Facilities Management

February

35 years: Randy Howell, PSD Integrated Research Operations; Edwin R. Blackburn, Research Reactors; Edward D. Blakeman, Reactor & Nuclear Systems; Joseph N. Herndon, ESH&Q Dir.

30 years: Terry C. Awes, Physics; Ellen D. Smith, Environmental Sciences

25 years: Lisa Violet Patt and Gerard Francis Payne, Quality Systems & Services; Anthony Wayne King, Environmental Sciences; Michael B. Gettings, Energy & Transportation

20 years: Donald J. Mercial, Information Technology Services; Amanda J. Denton, Integrated Operations Support; Tommy Joe Phelps, Biosciences; Lori Jean Lane, Neutron Sciences Dir.; Denise Overton, Energy & Transportation Science; Gregory Roy Larson, Environmental Protection & Waste Services; Gary L. Bell, Fuel Cycle & Isotopes; Gregory Allen Johnson, Facilities Management; Joann Leinart, Health Services; Sherry Estes, Energy & Environmental Sciences Dir.; Connie E. Arnwine, Prime Contract Administration

March

35 years: James Samuel Goddard, Jr. and Larry D. Phillips, Measurement Science & Systems Engineering; Richard A. Boody, Utilities; Saylor B. Hummel, Human Resources & Communications Dir.; Tom T. McConnell, Nonreactor Nuclear Facilities; Marcia D. Whitson, Business Services Dir.; Jimmy Steve Davis, Logistical Services; Leonard P. Phillips, Jr., Global Nuclear Security Technology

30 years: Daniel G. O'Connor, Facilities Management

25 years: Karen Ann Moore, Oak Ridge Counterintelligence; Mark H. Robbins, Human Resources & Communications Dir.; Stan Cooper, PSD Integrated Research Operations; Keith Thomas Sanford, Information Technology Services; Dana Lynn Cox and David Andrew Denning, Logistical Services; Eliot D. Specht, Materials Science and Technology; Mark A. Buckner, Measurement Science & Systems Engineering; Robert Howard Morris, Computational Sciences & Engineering

20 years: Mark Matthews Delph, Nonreactor Nuclear Facilities; Angela D. Raby, Global Security Dir.; Kathy Ann Brown, Logistical Services; David Alan Craft, Nuclear & Radiological Protection; Scarlett R. Clark, Contracts; Neil R. Giffen, Environmental Sciences; Eric W. Laubach, Safety Services





A FIRST kickoff attendee examines a titanium sphere at the MDF.



Lonnie Love (left) shows elementary school visitors how to operate a robot.

Robotics competition couples contest with advanced manufacturing

Nine local schools converged on ORNL's new Manufacturing Demonstration Facility on Jan. 7 for the formal kickoff to the FIRST robotics competition, a nationwide event that promotes science and engineering for high school students.

The FIRST robotics competition will serve as a platform for ORNL mentors to educate high school students about advanced manufacturing. After school daily and on weekends, students from local schools work with ORNL engineers and scientists to design robots that can play basketball. Starting from the ground up, students use additive manufacturing to develop prototypes and create working components and systems as part of their robots.

Lonnie Love, an ORNL senior research scientist in robotics, serves as one of the FIRST robotics competition mentors. Love credits Dean Kamen, the founder of FIRST, with giving students a reason to pursue careers in science and engineering.

"Dean noticed that high school students were aspiring to be actors and athletes," Love said. "He wanted to inspire kids to become scientists and engineers by getting them to work hand in hand with engineers to see what happens when you create something."

Last year, ORNL supported Hardin Valley Academy in their rookie season and helped the students learn how to design, fabricate and test components. Three HVA students later conducted their senior project at ORNL with a focus on additive manufacturing, and their work resulted in an invention disclosure and interest from multiple robotics companies in licensing the technology. HVA was selected as the top rookie team in regionals and invited to nationals in St. Louis, where they were again named one of the top rookie teams.

This year, ORNL is supporting nine high schools by opening up workspace in its new MDF to those interested in learning and using additive manufacturing technologies. In addition, ORNL is providing financial assistance, encouraging more ORNL research staff to volunteer as mentors and engaging additive manufacturing companies in providing financial

support and hardware donations. Engineers and scientists are at the facility weeknights and weekends, working closely with the students and teaching them all aspects of additive manufacturing.

"We're exposing the next generation of engineers to the next generation of manufacturing."

On Saturdays, students gather for lunch to share progress and discuss challenges for building robots.

A goal of ORNL's Manufacturing Demonstration Facility is to focus on advancing technology – developing new materials, new processes, introducing in-situ feedback and control – as well as assisting companies interested in evaluating the technology for future products. One of MDF's thrust areas is additive manufacturing, which enables the manufacture of components through additive processes, such as lasers, electron beams, and fused deposition modeling. Rather than being dependent on subtractive processes like cutting and turning, additive manufacturing starts from scratch, building with intricacies previously thought impossible.

"We're like the three legs of a stool," Love said. "One, we're working closely with equipment manufacturers to help them improve quality control and looking at advanced materials. We're also working with companies that are interested in trying out equipment. Lastly, we're exposing the next generation of engineers to the next generation of manufacturing." —Emma Macmillan 🌱

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.

- February 13** Lady Vols Basketball vs. Kentucky
- February 16** Shrek
- March TBD** Dollywood/Splash Country Ticket Sale
- March 17** Knoxville Ice Bears vs. Mississippi Riverkings
- March 31** South Pacific

Dolynn Loy: Claim your motivation

Dolynn Loy started her weight loss journey at 36 and 348 pounds. She's now 44 and down to 146 pounds. If you're wondering how Dolynn lost 202 pounds, here's her weight loss secret: "There's no secret. It's hard work, determination, exercising and eating healthy," she said.

In August 2003, Dolynn decided to start losing weight and by June 2008, she was down to 187 pounds. In the beginning, Dolynn says she decided to lose weight for her daughter, who was also overweight at the time. She could see that her daughter was following in her unhealthy footsteps and wanted to change that pattern.

"I treated exercise like a job," said Dolynn, administrative assistant to the lab shift superintendent. "I saw myself as a dedicated employee, and I knew if I put as much effort into working out as I did my job, I could lose the weight."

Before going on a diet or exercising, Dolynn figured out that she needed to set goals for herself. "If you don't have a goal, you have nothing to look forward to or gain," she said.

So, Dolynn set a long-term goal to lose 170 pounds. She also set short-term goals to lose a specific manageable amount of weight in a certain amount of time. When she reached a short-term goal, she made a new one.

Once Dolynn set her goals, she decided on dietary guidelines and started a low-carb diet. For five years, she consumed only 20 grams of carbohydrates per day but quickly realized that being on such a strict regimen meant she had to reward herself. So every time she reached a goal, she allowed herself to have pasta or pizza for one meal and then got back on track.

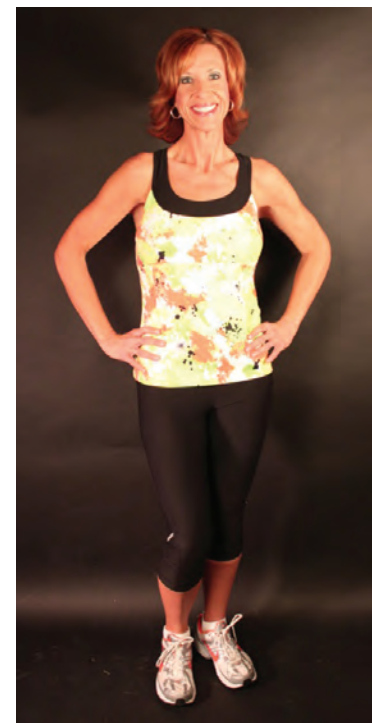
Despite sticking to the low-carb diet and exercising, when she got close to her long-term goal, she gained 30 pounds. At this point, she realized she had to change something else about her lifestyle.

"I went to a low-fat diet," Dolynn said. "I joined a gym, got an exercise partner and a personal trainer."

After making these changes, Dolynn lost 71 pounds, arriving at her current weight of 146 pounds. "If it's not working for you, change what you're doing," she said. "You have to want it to work. You have to claim your motivation."



Loy started her weight loss journey at 348 pounds.



She now exercises regularly to maintain her weight loss.

Info sessions scheduled about 2012 Medco drug programs for CIGNA enrollees

Participants in UT-Battelle's CIGNA health care plan have received a letter about two new drug programs from Medco, which went into effect on Jan. 1, 2012. The information explains advantages of mail-order and generic prescriptions and ways to make the most of the new program. Please read the information carefully to familiarize yourself with the changes and minimize your prescription drug expenses.

If you have questions about the changes, Medco will host information sessions Feb. 22 at the American Museum of Science and Energy (AMSE) to explain the new drug program and answer questions. The meetings will be held at AMSE from 3 p.m. - 4 p.m. and 5:30 p.m. - 6:30 p.m.

On Jan. 18, Director Thom Mason announced changes to the retirement plans and CIGNA medical plans for active employees. Please note that these changes **DO NOT** impact retiree pensions or retirees or spouses in the CIGNA plans. Information will be provided soon about the new Medicare supplement exchange program for retirees and spouses on Medicare.

THE NEWS

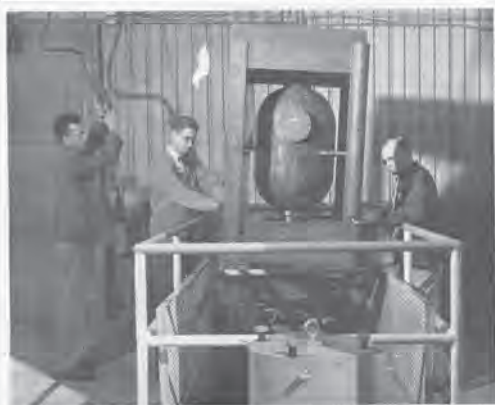
OAK RIDGE NATIONAL LABORATORY

A Publication by and for the ORNL Employees of Carbide and Carbon Chemicals Company, Union Carbide and Carbon Corporation

Vol. 4—No. 30

OAK RIDGE, TENNESSEE

Friday, February 8, 1952



THE LARGEST COBALT-60 SOURCE ever produced in the United States for treatment of cancer in humans is entering the final phases preparatory to shipment. Loading of the source is being handled at ORNL; above, left to right, Henry Grimac, W. R. Casto, and G. L. Neely are shown juggling the 3000-pound container on a crane in preparation for one of the important decontamination processes necessary before the source is ready for shipment. The radioactive cobalt will be shipped to the Los Angeles Tumor Institute, Los Angeles, California, under authorization of the AEC. The 1000-curie source has an energy equivalent approximately that of an amount of radium worth about \$25,000,000 at the current price level—more than the world's present supply—but the cost to the institute was less than \$10,000.

Carbide Camera Club Sponsors First Corporation-Wide Color-Slide Contest

The first Corporation-wide color-slide contest sponsored by the Carbide Camera Club will be held on March 20, 1952, in New York. The contest is limited to 35-millimeter or bantam color slides, and all employees of Union Carbide and Carbon Corporation or one of its Divisions or Units are eligible to enter.

Entries should reach New York no later than March 1, 1952. No contestant may submit more than two slides, and these must be in two-inch-square cardboard or glass mounts.

An entry blank must accompany every slide, or set of slides. The form printed on page 3 of this issue may be used. If entrants desire more than one blank, they may type or print a duplicate.

The ten best slides will receive awards of \$5.00 to \$100.00. Prizes are:

1st prize	\$100.00
2nd	50.00
3rd	25.00
4th and 5th	20.00
6th and 7th	15.00
8th, 9th, and 10th	5.00

Three nationally known men will judge the prints March 20. They are: Al Dorne, famous illustrator for the Saturday Evening Post; Victor Keppler, outstanding advertising photographer; and Franc Ritter, art director for Eastman Kodak.

Entries should be mailed, with an entry blank, direct to Print Committee, Carbide Camera Club, 30 East 42nd Street, New York 17, New York.

Slides will be returned by the committee. Awards will be announced shortly after March 20, and prints of winning slides will be exhibited in New York.

Anyone desiring further information about the contest should contact the Recreation Department, Building 1000, phone 6111.

Girls Club Dance Feb. 9; Miss ORNL Voting Ends Today

The Girls Club annual Valentine dance tomorrow night, February 9, will be held in the Oak Terrace. The twelve contestants for Miss ORNL of 1952 will be presented by Dr. Larson during the intermission.

Clarence Neal's orchestra will be featured, and, as a result of voting which closed today, Miss ORNL will be announced. Both the first- and second-place contestants will receive awards from the Girls Club. Grace McCammon, president of the club, will give a short welcome.

Ticket sales have advanced rapidly, and, at this time, it is doubtful that tickets will be on sale at the dance. There will be no voting for candidates at the dance, since votes will have to be counted and the winners decided by that time.

The dance will be held from 8:00 PM to 2:00 AM in both the Starlight Room and the ballroom. Inquiries regarding tickets should be made to any representative of the Girls Club. Reservations for tables can be obtained from Zella Bonner.

ORNL Credit Union Computes Annual Dividend at \$8,436.56

Treasurer's Report Reveals \$296,000 in Assets; CU Not to Advance Loans for Purchase of Homes

The ORNL Employees' Federal Credit Union has declared a dividend of \$8,436.56 for the year 1951. Bob Martin, treasurer of the organization, announced that this amount will be added to the accounts. No checks will be issued by the Credit Union, but any member wishing to withdraw his dividend may do so just as he would make a withdrawal from his account.

Members who receive dividends of \$100.00 or more are reminded that this must be reported to the Office of Internal Revenue.

Press, Radio Tour Scheduled at Lab; Fourth ORNL Visit

Leading newspaper and magazine science writers and radio, television, and newsreel representatives are scheduled to tour newly declassified areas of the Laboratory February 13 on ORNL's fourth general press tour. The tour will be sponsored by the Laboratory, the AEC, and Carbide and Carbon Chemicals Company.

The tour will include the complete graphite reactor or pile, the newly constructed Solid State facility, and the new Instruments Laboratory.

It will be the first opportunity for photographic coverage of many of the aspects of reactor operations, including controls, loading and discharging facilities, and various experimental assemblies. The Solid State Division is...

Mineralogists To Hear Crystallization

Sixty years ago this month

Taken from *The ORNL News* for February 1952

- Leading media and press representatives receive a tour of the newly declassified areas of the laboratory. These areas are the X-10 Graphite Reactor, the new Solid State facility, the instrument shop and the radioisotope area.
- The largest Cobalt-60 source ever produced in the U.S. for treatment of cancer is in the final phase for shipment to the Los Angeles Tumor Institute. The 1000-curie source has an approximate energy equivalent of \$25 million of radium, but the cost to the institute was only \$10 thousand.
- The Oak Ridge Office of Community Affairs is trying to determine if families are interested in purchasing single and duplex housing. Properties and lots for sale are offered in the following order of priority: current occupant, non-occupant employed by the atomic energy program, and general public, respectively.
- Dr. N.S. Gingrich, professor of physics, has taken a sabbatical leave from the University of Missouri to work at ORNL in the areas of neutron diffraction and antiferromagnetic properties of crystals.—prepared by ORNL History Room volunteers

RADIOACTIVE WIRE
Empire Steel Castings, Inc., of Reading, Pa., has disclosed the use of radioactive cobalt wire for examination of steel castings for internal defects. The company explains that the advantage of the cobalt isotope is its relatively low cost compared to radium, and that it can be used without expensive machines.



SCOUTMASTERS—Just as Carbide and Carbon Chemicals Company, and its surrounding localities, many of its employees above are local scoutmasters active in your community. Row: R. J. Dunbar, AEC; Jim Winters, K-2; Craven, K-25; E. W. Hobson, ORNL; Abbe, K-25; and William Harris, K-25.

From the Lab Director

Let me start by wishing everyone a happy New Year. The end of 2011 was an eventful time for the Lab, particularly with the departures of 220 staff members under the second Voluntary Separation Program in a year's time. We ended 2011 on a high note with a good "report card" for UT-Battelle from the Office of Science. The mix of A-minus and B-plus ratings for research and operations continued our string of attaining 94 percent of our potential fee from DOE. We were especially pleased to receive a grade of A for contractor leadership and stewardship. ORNL Site Office Manager Johnny Moore praised our work in a number of areas, including supercomputing, neutron sciences, nuclear nonproliferation, construction and maintenance of facilities, partnerships, and safety.



The completion of the FY12 appropriations process in December was good news, given the federal budget climate. Budgets are flat overall with a few areas of reduction, but there are modest increases for some key programs as well as a few new opportunities.

Around the Laboratory, I recently hosted a Service Awards breakfast for staff celebrating 30 years or more of employment at ORNL, and also hosted a new employee coffee to greet new arrivals to the Lab.

Staff members who have been honored by major professional societies include Mike Simpson, Fellow of the American Association for the Advancement of Science; Hans Christen, Fellow of the American Physical Society; Ken Tobin, Fellow of the Institute of Electrical and Electronics Engineers; David Dean, Fellow of the Institute of Physics; and Peter Cummings, American Society of Mechanical Engineers' Touloukian Award. Lee Riedinger, director of the UT-ORNL Bredesen Center for Graduate Research and Education (CIRE), was also named a AAAS Fellow. Of course, Amit Goyal's E.O. Lawrence Award from DOE in late November was a tremendous honor for both Amit and the Laboratory.

I recently hosted Congressman Ralph Hall, who chairs the House Space, Science and Technology Committee. He visited ORNL for the first time at the invitation of Congressman Chuck Fleischmann.

Again, have a productive, safe, and happy New Year.

"We ended 2011 on a high note with a good "report card" for UT-Battelle from the Office of Science."



Congressman Ralph Hall, who chairs the the House Space, Science and Technology Committee, paid his first visit to ORNL in January.

Thomas Mason

Thom Mason



Oak Ridge National Laboratory
Reporter
P.O. Box 2008
Oak Ridge, TN 37831-6266

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SNS exhibit 'hits the target'

A new Spallation Neutron Source exhibit has been making the rounds at science festivals locally and nationwide. The exhibit was featured at the U.S. Science and Engineering Festival on the National Mall during fall 2011 as well as Oak Ridge's Secret City Festival. Look for it at a science festival near you!



One part of the SNS display shows the flight of a proton through the linear accelerator to the target, which the protons hit to produce neutrons.