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Tennessee Engineer Newsletter

Engineering

Fall 2012

# Tennessee Engineer Fall 2012

College of Engineering

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TENNESSEE FALL 2012

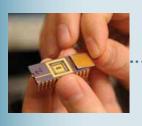
# ENGINEER

THE UNIVERSITY OF TENNESSEE, KNOXVILLE • COLLEGE OF ENGINEERING

Mission to Mars: The UT Connection



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# **Dean's Message**

I am often asked to provide statements about the value of engineering to the economy and to society. This has been a subject of much interest as a result of the economic challenges that have faced many countries over the last five years. Such requests often go further to ask if it is possible to quantify the effect of our engineering graduates or the impact if we were to increase the number of graduates. I thought about this recently as I was reviewing an Environmental Protection Agency software package called Unmixit's a multivariate analysis model that allows one to enter the concentrations of hundreds of volatile organic compounds and other pollutants measured in the environment. Then, knowing the characteristic signatures of what specific sources produce or emit, it identifies all of the contributing sources and the relative contributions of each source to the observed air quality data.

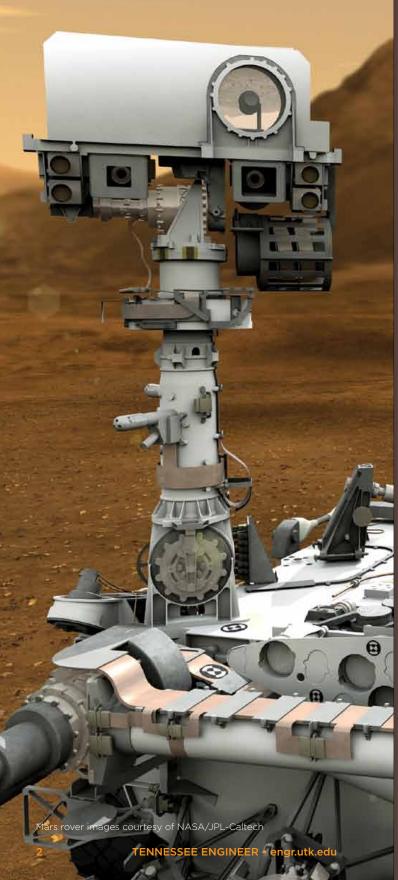
What if this package could look at our world and analyze which professions contributed to society and its economic and technological developments and how much? If you have found a model that does that, please let me know. What we

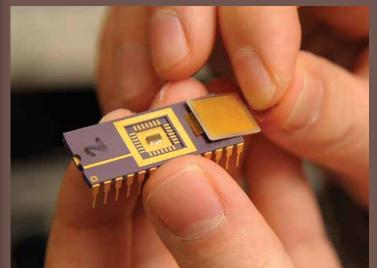
do know is that our graduates and the professions in which they work have contributed in innumerable ways—but not easily quantified from a monetary standpoint. How would one assess the value of the invention of the personal computer; a GPS device; an airplane (or jet)? How does one measure the value that is created by the many engineers who design our highways and infrastructure, or develop new materials that go into every product that is currently manufactured? How does one measure the value when engineering graduates start their own companies, become senior leaders or CEOs, surgeons, and/or lawyers, contributing their critical thinking skills to professions that go well beyond engineering?

One of our featured articles in this newsletter is about extremely robust microchips created by one of our faculty members and his student research team that are now installed on Curiosity, the rover that just landed on Mars in August. While the chips provided functionality that goes well beyond the world in which we live, these, like many other developments intended to study things beyond our planet, often find their way back into applications that are much closer to home. While we cannot begin to truly assess the economic value of the contributions of our graduates, we can all be proud to be a part of a profession that is constantly making a positive difference in this world...and beyond!

Wayne & Davis

# **College of Engineering Team** Develops Chips for Mars Rover





A close-up shot of the MSL QOA microchip.

As NASA's rover Curiosity touched down of the surface of the planet Mars on August 6 at approximately 1:30 a.m. EDT, a UT College of Engineering professor was not watching to see the completion of the successful 354-million-mile journey of the vehicle he helped to create.

"I was too nervous to watch the landing," said Ben Blalock, a professor in the Department of Electrical Engineering and Computer Science. "I'm just glad that we made it."

Blalock and his research team, the Integrated Circuits and Systems Laboratory (ICASL), partnered with the Jet Propulsion Laboratory (JPL) (a National Aeronautics and Space Administration (NASA) Center of Excellence for robotic space exploration) in the design and development of the Mars Science Laboratory (MSL) Quad Operational Amplifier (QOA) microchip. This microchip is used in the motor controller electronics on Curiosity for wheel motors, robotic arm actuator motors, camera positioning motors, and other functions. Each motor controller is housed in an actuator assembly that has a position encoder circuit using two QOA chips. Since Curiosity has at least forty actuator assemblies around its periphery, some eighty copies of the QOA microchip are used on the MSL Mars rover. The QOA microchips are exposed to the ambient environment on the Mars surface, daily subjected to -120°C to +20°C temperature swings.

The involvement of Blalock and his team in the Mars rover project was initiated by a joint project with the JPL.

"Our team worked in collaboration with the JPL to develop electronics technologies for the extreme environments of space," Blalock said. "For example, the Mars surface temperatures vary from -120°C to +20°C and the moon's surface temperature changes from -180°C to +120°C. These temperatures are much different from what electronics will see on earth (-55°C to +125°C). JPL recognized the need for developing ground breaking technologies and established a collaborative consortium for this purpose. We were privileged to be part of this consortium."



This is a still from an interactive web feature that guides you through the entry, descent and landing of NASA's Curiosity rover. Visit the feature at: <a href="http://mars.jpl.nasa.gov/msl/multimedia/interactives/edlcuriosity/index-2.htmlg">http://mars.jpl.nasa.gov/msl/multimedia/interactives/edlcuriosity/index-2.htmlg</a>

Blalock and his team moved forward on the design phase of the chips in 2004. The Curiosity has significantly different components than the previous Mars rovers.

"Thanks to extreme environment capable electronics, the Curiosity rover uses a distributed system architecture in contrast to the centralized system architecture utilized in the previous two Mars rovers, Spirit and Opportunity," Blalock commented. "The bulk of the electronics required for Spirit and Opportunity are housed within the Warm Electronic Box (WEB) of those rovers, requiring many long cables routed out to the ambient environment. The WEB provides a protected, regulated operating environment for the electronics. The Curiosity has significantly more scientific instrumentation then the previous rovers and its distributed system architecture helped the JPL engineers and scientists optimize the rover's capability versus size and weight tradeoffs. For example, having the motor controllers outside the WEB helped minimize cabling complexity on Curiosity. However, no commercial-off-the-shelf operational amplifier chips could reliably operate under the temperature extremes of Mars, as well as demonstrate radiation immunity. This provided UT-ICASL with a unique opportunity to further its research in extreme environment electronics."

Two of Blalock's research students, Stephen Terry and Robert Greenwell, worked with him on the MSL QOA microchip during 2004-2007. The majority of the UT-ICASL effort was completed by the end of 2006. Stephen Terry completed his PhD degree at UT in August 2005 and is now an analog/mixed-signal integrated circuit (IC) designer at Texas Instruments specializing in power management ICs. Robert Greenwell completed his M.S. degree in electrical engineering in December 2006 and is nearly finished with his PhD degree at UT. Greenwell's M.S. thesis, *Design of a 5-V Compatible Rail-to-Rail Input/Output Operational Amplifier on a 3.3-V SOI CMOS Process for Wide Temperature Operation focused on the MSL QOA microchip.* JPL shepherded the overall project, providing the target performance specifications, reviewing the team's progress throughout the effort, including critical design reviews, and conducted extensive testing for the flight qualification process of the MSL QOA microchip.

This past summer, three of Blalock's research students worked as summer interns at JPL. They had the unique opportunity of observing the Curiosity landing first hand with other JPL engineers and scientists.

"The excitement from our research students' experience with the landing inspired the UT-ICASL team, and they are proud to be part of a university research group whose legacy includes contribution to the historic MSL rover mission," Blalock said. "I am hopeful that a new generation of UT students will continue the Tennessee tradition of groundbreaking innovative research."

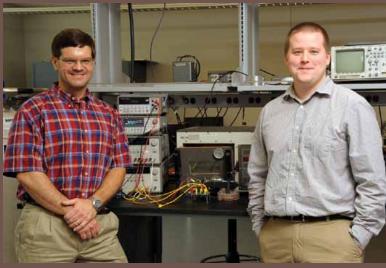
Despite the excitement about the mission, landing on Mars wasn't easy. When the Curiosity launched on November 26, 2011, NASA engineers initially referred to the entry, descent, and landing (EDL) of the spacecraft in August 2012 as "seven minutes of terror."

The Curiosity, which weighs a ton and is about the size of a small SUV, approached Mars at about 13,000 miles per hour. When the Martian atmosphere slowed the craft to about 900 miles per hour, a supersonic parachute deployed, slowing the craft even further. But the rover was still descending too quickly to land in one piece.

After the rover separated from the parachute, rocket motors fired, continuing to slow the descent. Once it reached about sixty feet above the surface, a "sky-crane" lowered the rover to its new home on Mars.

"Tonight, on the planet Mars, the United States of America made history," President Barack Obama said in a statement released immediately after the landing. "I congratulate and thank all the men and women of NASA who made this remarkable accomplishment a reality-and I eagerly await what Curiosity has yet to discover."

"Curiosity is representative of a design paradigm shift in space avionics, made possible by exploiting extreme environment electronics," Blalock commented. "Curiosity is the most advanced exploration vehicle ever conceived by humankind. It is exciting to imagine how extreme environment capable electronics can impact future space exploration. Here on Earth, advances in



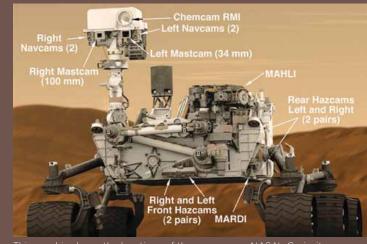
Dr. Ben Blalock (left) and PhD student Robert Greenwell (right) worked together on the MSL QOA microchip project for NASA's Mars Rover Curiosity.

extreme environment electronics benefit numerous terrestrial applications, including high-temperature electronics for deep well oil exploration, geothermal energy, and hybrid-electric vehicles."

Blalock hopes the success of Curiosity inspires the support for future missions. Eliminating the overhead (mass and power) associated with keeping spacecraft electronics in an earth-like environment, he said, is the "Holy Grail" in space technology. Future robotic exploration interests include Europa (moon of Jupiter) and Titan (moon of Saturn). He is optimistic that the MSL QOA microchip can contribute to future missions requiring extreme environment capable electronics.

"The QOA chip is an example of the pioneering work that is the signature of our nation," Blalock stated. "It is about forging ahead, even when the problem's solution is not initially apparent. Just because something seems impossible does not mean it is. I am very proud of the exceptional work that Robert and Stephen did on this project. The MSL QOA microchip necessitated new 'outside the box' analog circuit design techniques and strategies, and the students delivered. Also, the students on the project learned a tremendous amount from working with the JPL engineers. I believe this helped the students realize that team effort is just as rewarding and important as individual effort. And I hope the UT-ICASL students' excitement about the Curiosity will help their research efforts aspire to new groundbreaking innovations."

For more information on the Mars Rover project, visit http://mars.jpl.nasa.gov/msl/.



This graphic shows the locations of the cameras on NASA's Curiosity rover. The rover's mast features seven cameras: the Remote Micro Imager, part of the Chemistry and Camera suite; four black-and-white Navigation Cameras (two on the left and two on the right) and two color Mast Cameras (Mastcams). The left Mastcam has a 34-millimeter lens and the right Mastcam has a 100-millimeter lens.

# **Faculty Updates**



UCOR Fellow Dr. Jason Hayward (far left) is joined by (left to right) COE Dean Wayne T. Davis; UCOR President and Project Manager Leo Sain; Professor and Head of the Nuclear Engineering Department Dr. Wes Hines; and UT Knoxville Chancellor Jimmy G. Cheek at a luncheon following the announcement of the

# **Hayward Named First UT UCOR** Fellow

UCOR (URS/CH2M Oak Ridge LLC), a Department of Energy (DOE) contractor in Oak Ridge, Tenn. has established the UCOR faculty fellowship in the University of Tennessee, Knoxville's College of Engineering (COE). The company donated \$250,000 toward the fellowship, and the first recipient is Dr. Jason Hayward, an assistant professor in the COE's Department of Nuclear Engineering (NE). Hayward, who was named a COE Research Fellow in 2011, is a top recipient of external research awards in the

Since arriving in 2008, Hayward has been awarded more than \$7 million in research funding. With these funds, his group has focused on research in areas of detector science and development of gamma ray and neutron imaging for applications in nuclear security, neutron scattering science, and medical imaging.

Because of his successful research related to the detection and identification of nuclear materials and its applications to nuclear nonproliferation and safeguards, the world will continue to become safer in a more economical way, Davis said.

Hayward holds a joint faculty position with Oak Ridge National Laboratory. He received his PhD in nuclear engineering and radiological sciences at the University of Michigan.

Leo Sain, UCOR's president and project manager, announced the fellowship on Friday, June 29, at the East Tennessee Economic Council meeting in Oak Ridge. Sain said UCOR established the

fellowship because it is committed to doing its part to ensure continued excellence in education in the nuclear field.

UCOR is a partnership between URS, a worldwide leader in environmental work, and CH2M HILL, the United States' largest environmental company, UCOR is committed to the long-term success of cleanup operations at the DOE Oak Ridge Reservation and also performs work at other DOE Oak Ridge Reservation sites. For more information about UCOR, visit www.ucor.com.

The Department of Nuclear Engineering is the ninth-ranked graduate program in the nation, according to US News and World Report.



Dr Peter Liaw

# **MSE Professor Receives Funding for Clean Coal Research**

Dr. Peter Liaw, professor and Ivan Racheff Chair of Excellence in Materials Science and Engineering, along with professional colleagues and graduate assistants, received a \$300,000 Clean Coal Research Award for Improved Structural Materials from the Department of Energy (DOE). The group's research focuses on increasing the efficiency of coal-fired power plants through the development of High-Entropy Alloys-a mixture of multiple principal efforts.

Approximately forty percent of energy in the US is produced by coal, and this form of power leaves behind the largest carbon footprint.

The award is part of a series that totals \$2.7 million that will eventually be awarded to nine universities across the country. UT joins other academic institutions such as Brown University and Dartmouth that have also

Liaw will collaborate with Fan Zhang of CompuTherm, LLC and graduate students Michael Hemphill and Louis Santodonato to optimize High-Entropy Alloys for use in steam and gas turbines at elevated temperatures and pressures. The technology will require less coal per megawatt hour to produce power.

leading to higher efficiency and lower fuel costs per megawatt. The team will also conduct focused experiments to examine the relationship between heat and mechanical energy to identify High-Entropy Alloys that outperform alloys used today.

For more information, visit www.netl.doe.gov/publications/press/2012/120606 obama administration.html.



# **COE Appoints New Associate Dean for Faculty Affairs**

COE Dean Wayne T. Davis has appointed Dr. Veerle Keppens, professor and associate head of the Department of Materials Science and Engineering (MSE) as the college's new Associate Dean for Faculty Affairs. Keppens will be the first female senior academic administrator in the college's history.

Keppens has been the recipient of numerous awards during her career, including the COE's Research Fellow Award in 2009; the Chancellor's Award for Professional Promise in 2007; and the MSE Outstanding Young Researcher Award in 2005. She is a Fellow of the Acoustical Society of America and is the faculty advisor for the UT student chapter of the Society of Women Engineers. She received her PhD from K.U. Leuven, Belgium.

Keppens will join Associate Dean for Academic Affairs Masood Parang and Associate Dean for Research and Technology William Dunne as part of the dean's senior leadership team.

Dr. Veerie Keppens

### **MSE Professors Receive Grants from NEUP**

Dr. Bill Weber, Governor's Chair in Radiation Effects on Materials, and Dr. Yanwen Zhang, an associate professor in the Department of Materials Science and Engineering, have won two significant research grants from the Nuclear Energy University Programs (NEUP) research and development competition. Weber's award for his proposal Radiation and Thermal Effects on Used Nuclear Fuel and Nuclear Waste Forms totaled \$770,000. The research will focus on investigating the structural and chemical response of used nuclear fuel and waste forms during interim storage and permanent disposal. Zhang's proposal Better Radiation Response and Accident Tolerance of Nanostructured Ceramic Fuel Materials received an \$815,000 grant from NEUP. Zhang's research will use novel experimental methods to investigate the links between microstructure, phase stability and damage evolution in nanostructured ceramic fuel materials.



Dr. Bill Weber



Dr. Yanwen Zhang

Dr. Belle Updhyaya

# **NE Professor Named ISA Fellow**

Dr. Belle Upadhyaya, a professor in the Department of Nuclear Engineering, has been named a Fellow of the International Society for Automation (ISA). Founded in 1945, the ISA is a leading, global, nonprofit organization that is setting the standard for automation by helping over thirty thousand worldwide members and other professionals solve difficult technical problems, while enhancing their leadership and personal career capabilities. Upadhyaya will be officially

recognized as a Fellow at the upcoming ISA Gala on October, 2012.

For more information, visit www.isa.org.

# **NE Professor and Department Head Receives Patent**

Dr. J. Wesley Hines, Charles P. Postelle Distinguished Professor in Nuclear Engineering and Head of the Department of Nuclear Engineering, was issued a patent, along with his PhD student, Dustin Garvey, for System and Method for Health Assessment of Downhole Tools in June. Information about the patent can be viewed at http://patents.uspto.gov/web/patents/ Dr. J. Wesley Hines patog/week25/OG/html/1379-3/ US08204697-20120619.html



# **Industrial Engineering Department Changes Name**

The Department of Industrial and Information Engineering (IIE) at the University of Tennessee. Knoxville (UT) is now officially the Department of Industrial and Systems Engineering (ISE). The name change, which became official on July 1, 2012, was part of a strategic initiative to enhance the department's teaching, research, and outreach mission by leveraging the intellectual core of the department through a systems perspective. The name change, which had unanimous faculty support, is consistent with a trend in Industrial Engineering (IE) to conceptualize, formulate, model, analyze, design, and implement systems for the service industry, manufacturing, and

The name change will not affect the current degree programs or course offerings for current UT engineering students. ISE has enhanced its teaching mission to include the following:





work with students in an industrial engineering laboratory.

education (classroom and industry experience) and cultural learning, including working on projects in a multicultural group.

- The redesigning of the undergraduate program to allow ISE to "graduate leaders in IE" that have IE technical skills and critical problem solving ability, linking technical skills to social issues and leadership abilities.
- The development of on-site M.S. programs at Y-12 and ORNL

"These positive changes will provide ISE a better ability to recruit both students and faculty, as well as the ability to place graduates in academia or industry," said Dr. Rupy Sawhney, professor and head of the ISE department.

The ISE's research productivity as measured by a variety of metrics, including research expenditures and PhD student enrollment per faculty, are on the rise. Research expenditures per faculty is up by close to one hundred percent to over \$200,000 in the past two years, while the number of PhD students per faculty now ranks UT-ISE in the top ten IE programs. ISE will continue the tradition of serving the community in variety of outreach activities that impact individuals as well as the economy of the state of Tennessee.

The UT Department of Industrial and Systems Engineering will be moving into its new location in the John D. Tickle Engineering Building in August of 2013. The facility is currently under construction on the engineering campus.

# **Faculty Focus**

# Dr. Roberto Benson, Materials Science and Engineering

Dr. Roberto Benson, professor and associate head of the Department of Materials Science and Engineering, speaks with equal enthusiasm about teaching, university service, research, and his pride in the accomplishments achieved by his students.

Born in Panama, Benson moved to the US for college, receiving his bachelor's degree in chemistry from Lewis University in Illinois in 1972 and his PhD in physical chemistry (focusing on polymers) from Florida State University in 1978. He had post-doctoral training in biomedical engineering at the University of Utah. After a few years as a research assistant professor of materials science and engineering and as an adjunct assistant professor of bioengineering at Utah, he became director of research at Vascular International Corporation in Salt Lake City.

"I worked in the development—modeling the stresses—of the diaphragm for the artificial heart," Benson said. "I was associated with the blood-contact group, and primarily with the vascular branch."

"I take my teaching seriously, and I try to meet the students' needs," Benson added. "They come by and we have a very cordial relationship. But if something is wrong, I don't mince words. I let them understand, but always from a point of respect."

He decided to head east in 1986 and joined the engineering faculty at UT. He was attracted to the university by the strong program in polymer research and the positive academic atmosphere. The position also put him and his wife, Barbara Glanz, and their children geographically closer to family.

"When I interviewed here, I found the people to be very nice," Benson said. "I was attracted to the fact that the faculty got along. Also, my wife is originally from Delaware and my relatives all live in New York. So it wasn't a bad idea to come here so that it would be easier to go back and forth."

Benson's current research is focused on developing material that will act as a scaffold for new tissue growth in bone and cartilage, then degrade and disappear.

Outside of the lab, Benson is active in the classroom and with campus support organizations that guide students toward realizing their potential, such as the Education Advancement Program (EAP), the Engineering Diversity Program, and the UT Commission for Blacks.

"Service is an important thing for me," Benson said. "As a minority, it's a case where you can give something back."

He sees this mixture as simply part of the job, with personal engagement with students as a priority.

"You have got to be interested in the students, in doing some services, and in teaching," he said.

Benson also seeks this work ethic in his students.

"My philosophy is very simple," he explained. "I would like you to come to class. I would like you to ask as many questions as possible. If you have the energy to follow me all over the place, I'll never be rude to you. I'll answer the same question in as many different ways as possible."



Dr. Roberto Benson (right) with MSE students Ryan Hammonds (left) and Pelagie Favi (right), both graduate students in polymer engineering.

Benson often uses his sense of humor to encourage students to keep a steady pace.

"My joke has always been, 'If this was easy, we'd stand outside and give you the degree,' "he said. "Another one of my standard jokes, that all of my students know, is, 'Sympathies are given out Wednesdays from 11:58 to 12:01.' "

The good-natured ribbing goes hand-in-hand with developing a professional relationship with the students.

"I take my teaching seriously, and I try to meet the students' needs," Benson added. "They come by and we have a very cordial relationship. But if something is wrong, I don't mince words. I let them understand, but always from a point of respect."

Benson enjoys seeing students overcome challenges and find success in engineering careers. He has particular respect for former students like Dr. Darnell Worley (*PhD/MSE*, '99), who was the first African-American student to get a PhD after participating in the Ronald McNair Post-Baccalaureate Achievement Program, now known as the Education Advancement Program. Worley now works for the Teknor Apex Company.

"This young man, he wasn't the greatest student in the beginning," said Benson. "He got into this program, he did his stuff, he became part of my lab, he got a masters, and he got a PhD Last year, he was promoted to Chief Technical Officer for all of Asia. I'm very proud of that young man because he was someone who actually worked hard"

# **College of Engineering Recognizes Achievers**

# at the 2011 Faculty and Staff Awards Dinner

The University of Tennessee, Knoxville, College of Engineering held its annual Faculty and Staff Awards Dinner on Thursday, April 12, 2012, at the Hilton Knoxville. Award winners, COE administrators and staff and their guests enjoyed a reception, dinner and awards program. The college's Board of Advisors and their guests also attended the dinner. COE Dean Wayne Davis, Associate Dean for Academic and Student Affairs Masood Parang and Associate Dean for Research and Technology Bill Dunne served as emcees for the event.



COE Dean Wayne Davis (left) presents the Nathan W. Dougherty Award to Dr. Tony Buhhl (right) at the 2012 Faculty and Staff Awards Dinner.

The Nathan W. Dougherty Award, the college's most prestigious honor, was given to Dr. Tony Buhl, president/CEO of EnergX, LLC. Buhl (BS/NE '63, MS/NE '64, PhD/NE '67) has led many successful turnarounds of major projects and organizations, with special emphasis on facilitating changes in their safety cultures. He has provided technical and executive

support to small businesses, large corporations, and federal agencies for more than thirty years. He served as the corporate site-wide ESH&Q vice-president at two large high-risk Department of Energy (DOE) closure sites-Rocky Flats and Hanford. He has also served as president and chief executive officer of a public company that provided management consulting, engineering, and software development. Additionally, Buhl was the CEO of a private company that offered environmental restoration and risk assessment products and services. He has served on several corporate boards.

In 1997 he co-founded EnergX, LLC, a service disabled veteran owned small business supporting the DOE and electric utilities nationwide from three regional locations, and he continues to serve as president and CEO today. Buhl has served as a senior executive at both the DOE and the Nuclear Regulatory Commission (NRC).

For five years, Buhl managed the Industry Degraded Core Rulemaking (IDCOR) Program, the power industry's response to the accident at Three Mile Island. A US consortium of sixty-three electric utilities, NSSS suppliers, and architect-engineering firms supported this international program. Buhl served as the industry spokesman with the NRC to resolve severe accident issues-cultural, hardware, and infrastructure.

He also supported the recovery efforts and safety evaluations in Russia following the Chernobyl accident. In 1985, he was elected a Fellow of the American Nuclear Society for his contributions and expertise in safety, risk assessment, and risk management.

College-wide faculty and staff awards presented at the event included:

Outstanding Support Staff Awards: **Amy Brewer**, Department of Chemical and Biomolecular Engineering; and **Randy Bond**, IT Team Leader, Department of Electrical Engineering and Computer Science.

Outstanding Faculty Advisor: **Dr. Hairong Qi**, Department of Electrical Engineering and Computer Science

Moses E. and Mayme Brooks Distinguished Professor Award: **Dr. John Schwartz**, Department of Civil and Environmental Engineering

Leon and Nancy Cole Superior Teaching Award: **Dr. Lee Han**, Department of Civil and Environmental Engineering

Charles Edward Ferris Faculty Award: **Dr. Edwin Burdette**, Department of Civil and Environmental Engineering

College of Engineering 2011 Teaching Fellow Award: **Dr. Ronald Pevey**, Department of Nuclear Engineering

2011 Research Fellows:

Dr. Joshua Fu, Department of Civil and Environmental Engineering

**Dr. Boashan Huang**, Department of Civil and Environmental Engineering

**Dr. Richard Komistek**, Department of Mechanical, Aerospace and Biomedical Engineering

**Dr. Michael Langston**, Department of Electrical Engineering and Computer Science

**Dr. Peter Liaw**. Department of Materials Science and Engineering

**Dr. Ivan Maldonado**, Department of Nuclear Engineering

Dr. George Pharr, Department of Materials Science and Engineering

Dr. Philip Rack, Department of Materials Science and Engineering

**Dr. Leon Tolbert**, Department of Electrical Engineering and Computer Science

Dr. Lawrence Townsend, Department of Nuclear Engineering



Dr. Wayne Davis (far left) with the college-wide award recipients: (left to right), Dr. Ronald Pevey; Dr. Edwin Burdette; Dr. Lee Han; and Dr. John Schwartz.



Dean Wayne Davis and the College of Engineering Research Fellows (left to right): Dr. Ivan Maldonado; Dr. Peter Liaw; Dr. Michael Langston; Dr. Boashan Huang; and Dr. Joshua Fu.





Amy Brewer (left photo) and Randy Bond (right photo) receive the Outstanding Support Staff Awards from Dean Wayne Davis (left in both photos) at the awards dinner.

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# **Special Features**

# The Reliability and Maintainability Center: Where Industry Meets Academia



Dr. Klaus Blache, far right, discusses the Design for Maintainability Lab (The Factory) with mechanical engineering students Adrian Womac, left, and Johnny Guidry. Students are building the lab, with Dr. Blache and Tom Byerley, to meet training needs of member companies and to support the RMC mantra, "World Class Companies Need World Class R&M™

The Reliability and Maintainability Center (RMC) is a crossroads where College of Engineering students and faculty work with members of industry to make valuable connections for education, research, information sharing, and ongoing industry partnerships.

The RMC seeks to advance reliability and maintainability education and practices within both the academic and industrial communities. Students gain valuable on-the-job experience through research projects and the center's internship program. Companies benefit from access to fresh ideas and approaches that save on cost by increasing throughput and improving safety and quality for their industries.

"We deliver programs and processes that lead to better results in the member companies," said Dr. Klaus Blache, RMC director and research professor.

The RMC offers a reliability and maintainability (R&M) certificate program for working professionals. This consists of six courses



Former RMC "boot camp" participant and intern Lindsev Hawkins, a 2011 graduate in industrial engineering, served her internship at Schlumberger, the leading oilfield services provider, and now works for the company in Texas.

and a results-based project (in industry) aimed at delivering measurable improvement. Several companies have already made it a requirement for their R&M engineers and technicians.

"We're business-focused," said Blache. "So if they use our processes and programs, the end result is that they are going to improve their operations and they're going to save money. It's a methodology to gain competitive advantage."

The RMC began in 1996 with twelve participating companies and now has more than forty member companies and organizations, including Alcoa, Bayer, Dow Chemical, DuPont, Eastman Chemical, General Motors, Nissan, Oak Ridge National Laboratories, Owens

Corning, RockTenn, Schlumberger. Shell Oil, and the U.S. Army. Discussions are in progress with Amazon, Kraft, and Bell Helicopter.

Summer internships put engineering students in the field with these companies. starting with a



The Reliability and Maintainability Center's summer internship program begins with a one-week "boot camp" for both students and company representatives.

one-week training program that mixes academics and professional

"We keep the students for the first week and put them through a reliability and maintainability boot camp," explained Blache. "What's unique about the spring class is that it's about forty percent students and sixty percent company representatives."

Company participants usually continue to work closely with students, in mentor or supervisory roles, for the fourteen weeks of the internship. The program boasts high job-placement rates for graduates, often with the companies where students intern. Some RMC graduates are now bringing their companies to the program.

"From the companies that I've talked to, they might come here and make seven job offers when they are done with interviews," said Blache. "They will say that five or six of the top seven all went through our program. These students talk with experience and they have more confidence."

The RMC also holds regular meetings for members to share practices and information, and sponsors an annual Maintenance And Reliability Conference (MARCON) for discussing new methods. applications, and techniques. The next conference is scheduled for Feb. 25-28, 2013. It will have eleven one- and two-day workshops, more than thirty papers, and three keynote presentations. One of this year's keynote presentations was by the vice president of Nissan, who brought an electric vehicle to display.

The RMC works in conjunction with the Reliability and Maintainability Engineering (RME) academic program, directed by Dr. Wesley Hines. Undergraduate students can minor in reliability and maintainability, while graduate students can earn master's degrees or graduate certificates through either on-campus or distance-learning courses. All College of Engineering departments, except for civil and environmental engineering, currently offer the master's degree in RME.

"This education program not only meets the needs of industry and government," said Hines. "It also builds relationships that lead to research funding and student employment opportunities."

For more information about the RMC, visit <a href="http://www.rmc.utk.edu">http://www.rmc.utk.edu</a>. For more about the RME program, visit <a href="http://www.engr.utk.edu/rme">http://www.engr.utk.edu/rme</a>.

## Jamie Anderson Porter is First Female African-American NE PhD Graduate



Dr. Jamie Anderson Porter

Jamie Anderson experienced a whirlwind of life changes this past spring, gaining a new title and a new name along the way.

Just days after becoming the first female African-American student to graduate from the University of Tennessee with a PhD in nuclear engineering, Anderson married her fiancé, Terry Porter, and became Dr. Jamie Porter.

The Knoxville, Tenn., native plans to keep charging ahead.

"Our nuclear engineering professors care so much about their students and seem to enjoy their jobs so much that I am now looking forward to becoming a professor at the college level," Porter said.

Porter's studies, within the radiological engineering concentration, included measurements and modeling of the effectiveness of shielding materials for use in space environments; Monte Carlo space radiation transport and shielding codes; and methods for estimating environmental levels of radioactivity. As a graduate research assistant, she helped develop improvements for the Cosmic Ray Telescope for the Effects of Radiation (CRaTER) instrument on NASA's Lunar Reconnaissance Orbiter (LRO) spacecraft and

analyzed data from the LRO mission. She also spent a summer as an intern at the Tennessee Valley Authority Watts Bar Nuclear Plant in Spring City, Tenn.

"Dr. Porter is very bright, personable, focused, hard-working, and a pleasure to work with," said Dr. Lawrence Townsend, who was her thesis advisor. "Her career goal is to become a university faculty member. There is absolutely no doubt in my mind that she will succeed in doing so."

In addition to her experience and coursework, Porter has been honored with several awards in her academic career, including the Hall of Fame Award at the 2012 Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP) Banquet.

"TLSAMP was so important to the jump-start of my engineering experience," Porter said. "It gave me a head start on the classes I would face as an incoming engineer."

Porter has presented numerous papers and co-authored journal articles on her research. She will continue her research with Professor Townsend on a post-doctorate basis at UT.

"Becoming the first African-American female nuclear engineering PhD graduate here at the University of Tennessee makes me hopeful for minority women here to follow." said Porter, "Nuclear engineering has an urgent need for greater diversity. Women and minorities need to do whatever they can to bring this field into the twentyfirst century. As a nuclear-engineering professor, I will hopefully encourage many more after me."

# **Lean Enterprise Summer Program brings International Students and Industry Together**



Dr. Rupy Sawhney, professor and head of the Department of Industrial and Systems Engineering, outlines the lean enterprise summer program during the opening ceremony.

Students from Mexico, Brazil, and China gathered at the Howard H. Baker Jr. Center for Public Policy on July 2 to kick off the 2012 Lean Enterprise Summer Program on the UT, Knoxville, campus.

The Department of Industrial and Systems Engineering (ISE), in partnership with international universities and corporate partners. presented the fourweek program, which offered the students

the opportunity to learn lean-enterprise practices while also gaining experience interacting on an international level.

Lean enterprise is the practice of creating value for consumers while using fewer resources and eliminating waste in manufacturing, management, and business systems. This summer program is also important to UT's Ready for the World initiative, which seeks to increase diversity among students, faculty, and staff.

"We believe this program is unique in the way it combines academia, practice, and international exposure in the topic of lean, which is useful not only for students, but as well for the industry within the region," said program director Enrique Macias de Anda.

Following an informal breakfast social at the launch gathering, students heard from Macias de Anda; Dr. Lee Riedinger, Interim Vice Chancellor for Research and Development; Dr. Wayne T. Davis, dean of the College of Engineering; and Dr. Rupy Sawhney, Weston Fulton Professor and head of the Department of Industrial and Systems

"Today we are consolidating a dream we had four or five years ago," said Macias de Anda. Program participation jumped from the previous year's twenty-six participants to more than ninety students. Organizers are encouraged by the healthy growth.

"We want to grow this so that it becomes a congress for lean enterprise," said Sawhney.

Riedinger compared the goal of lean enterprise with research partnerships such as UT-Battelle.

"We are working on lean renewable energy sources, as this program seeks to educate on lean manufacturing," he said.

Davis stressed the importance of understanding fellow researchers from across the globe.

"Lean manufacturing is how we're all going to remain competitive on a global basis," said Davis.

Over the course of the program, participants learned lean techniques while working in groups that mixed students from the different universities. The groups tackled seventeen different projects at partner companies, which included Arc Automotive, Brunswick, East Tennessee Children's Hospital, Energizer Personal Care, Fulton Bellows, Homesteader Trailers, Jost International, and Monterey Mushrooms.

"Students were really happy with what they learned, and all the companies were highly satisfied with the results of the program," said Macias de Anda.

Many of these companies have implemented student recommendations from the previous year's program. When the companies report these improvements to state government, a positive ripple effect occurs.

"You will actually make an impact on the state of Tennessee.' Sawhney told students.



International students at the opening ceremony for the 2012 Lean Enterprise Summer Program

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# **COE Celebrates 100th Anniversary of Engineers Day**

The 2012 Engineers Day, on Oct. 25, will mark the one-hundredth anniversary of this UT College of Engineering tradition. Engineering students and faculty will interact with hundreds of potential engineering majors from high schools across the region.

Events of the day include exhibits and demonstrations prepared by UT engineering student clubs and societies from the different engineering disciplines. At least four competitions will challenge the visiting students and inspire them with the ever-growing fields of engineering.

The Quiz Bowl pits teams of four against each other in three rounds of multiple-choice questions. The Egg-Drop Competition challenges students to design a device that will protect a large, plastic egg from breaking when dropped. The ASCE High School Balsa Wood Bridge Competition tests the structural efficiency of miniature bridges constructed by participating students. The Food Battery Competition, in its second year, provides a lesson in emissions-free transportation.



Mark K. Cox

The keynote speaker this year will be Mark K. Cox (BS/ChE '89), vice president of worldwide engineering and construction for the Eastman Chemical Company. The Kingsport, Tenn., native joined Eastman as a co-op student in 1986 and has served in several management and leadership roles. He is a licensed Professional Engineer, a senior member of the American Institute of

Chemical Engineers, and a member of the Tau

Engineers Day began in 1912 when UT engineering students were enlisted to

Beta Pi Engineering Honor Society.

complete construction of a road from the foot of The Hill at Main Avenue to Estabrook Hall. Students from the "domestic science" (or home economics) class provided lunch. Dr. Charles A. Perkins served as a water boy and his fellow UT-COE building namesake Dean Charles E. Ferris oversaw the work.

When the day was done, it was decided that an annual event should be established "for the purpose of accomplishing some worthy piece of work or promoting some valuable enterprise." Over the decades, Engineers Day evolved into its current format, with the goal of inspiring future engineers to follow one of the Science, Technology, Engineering, and Mathematics (STEM) fields.

In conjunction with the 100th anniversary of Engineers Day, the COE asks alumni around the world to show their school colors by wearing orange on Oct. 25. Alumni can send photos of their orange attire, and their Engineers Day memories, to Juliette McClure at jmcclu10@utfi.org, or post it to the college's Facebook page at http://www.facebook.com/coe.utk.

The Bryce Corporation will sponsor student groups from Memphis, where the company is based, for the 2012 Engineers Day. The family-owned business is an industry-leading supplier of innovative flexible packaging and prepress solutions.

General Motors will have a selection of cars on exhibit, and representatives will be on-hand to answer questions.

Tau Beta Pi also sponsors the event. The engineering honors society, headquartered at UT since 1907, has offices in the Dougherty Engineering Building.

For more information, visit <a href="http://www.engr.utk.edu/ed/">http://www.engr.utk.edu/ed/</a> or contact the College of Engineering's Office of Academic and Student Affairs at (865) 974-2454.





Engineering students and faculty work together to construct Estabrook Road on the first Engineers Day in 1912.



Students from "domestic science" class provided lunch for the engineering crew on the first Engineers Day in 1912.



"As the UCOR (URS/CH2M Hill Oak Ridge LLC) Faculty Fellow in Nuclear Engineering, I have found that in addition to the strong support that I have received from the College of Engineering and the University of Tennessee, Knoxville, I have the support and encouragement of our local community as well. This support allows me to continue to invest in my students and work toward solving grand challenges in the area of radiation instrumentation. I am very grateful for this opportunity extended by UCOR, knowing that this gift and other generous gifts will enable us to reach our goal of becoming a Top 25 ranked engineering college."

Jason Hayward UCOR Faculty Fellow Department of Nuclear Engineering



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KNOXVILLE

# **Student Feature**

# **Team UT Continues ATVC Success at EcoCAR 2**



MABE professor and head Dr. Bill Hamel welcomes the media and quests at the EcoCAR 2 event on August 6.

The University of Tennessee. Knoxville, College of Engineering has been participating in the Department of Energy's (DOE) Advanced Vehicle Technology Competitions (AVTC) since 1989. Dr. Jeff Hodgson, a professor emeritus in the Department of Mechanical, Aerospace and Biomedical Engineering (MABE) initiated UT's involvement in the programs and served as faculty advisor to the AVTC teams until 2004, when Dr. David Irick, a MABE research assistant professor, took over after Hodgson's retirement. Since 1989, UT has had more than five hundred students participate in the competitions.

DOE partners with one of the U.S. major automobile manufacturers for the competitions, and twenty-eight AVTCs have been sponsored. The intercollegiate competitions are designed to help educate the next generation of automotive engineers and to accelerate the development and demonstration of technologies of interest to DOE and the automotive industry.

In 2011, the UT team entered the EcoCAR 2: Plugging In to the Future competition, sponsored by DOE, General Motors, and more than twenty-five government and industry supporters. EcoCAR 2 is a three-year series that requires students to explore a variety

of powertrain architectures focusing on electric drive vehicle technology. Phase 1 of the competition was held May 18-23, 2012 in Los Angeles, Calif. and involved fifteen North American universities, including Virginia Tech, The Ohio State University, and Penn State.

The UT team performed well in Phase 1, placing sixth overall and achieving a perfect score on the Controller Hardware-in-the-Loop report and second place for their Mechanical Presentation.

The team has now received the keys to a 2013 Chevrolet Malibu that they are going to remodel to make more eco-friendly as part of the Phase 2 EcoCAR contest. The graduate and undergraduate engineering students are challenged to reduce the environmental impact of the Malibu without compromising performance, safety, and consumer acceptability.

"The real-world experience these students are receiving is invaluable," said Irick. "They will actually get to see something they've developed in practice. But what is more is that we are training our future engineers to create products that take into account the environmental impact."

The Malibu was showcased at a special media presentation on Monday, August 6 on the top floor of the 11th Street Parking Garage with members of the EcoCAR 2 team, Dr. Bill Hamel, professor and head of the MABE department, and COE Dean Wayne Davis. Also present at the event were representatives of the Denso North America Foundation, which provided additional support of \$50,000 over two years.

"The technology in these advanced vehicles is allowing us to use multiple sources of energy within the vehicle, which, in the end, allows us to use less fuel on an average commute," said Mitchell Routh, controls team lead and a graduate student in mechanical

"On average, over seventy-five percent of students who have been involved in these alternative vehicle competitions go on to enter the automotive industry after graduation," said Davis at the event. "This is a phenomenal way to train the engineers of the future and also offers an opportunity to create products that take into account environmental impact. Our university is currently increasing the number of 'green initiatives' and this program ties into that very well."



Attendees at the EcoCAR 2 media event included (left to right): COE Dean Wayne Davis; MABE professor and head Dr. Bill Hamel; MABE research associate and outreach advisor Scott Curran; MABE adjunct professor Dr. Robert Wagner; MABE research assistant professor and team faculty advisor Dr. David Irick; MABE adjunct professor and team faculty co-advisor Dr. David Smith; and EcoCAR 2 team members Emily Wise, Katelynn Routh, Ryan Howell, Michael Pickelsimer, and Mitchell Routh. Denso Foundation representatives (in orange shirts) Jody Knight and Chris Kilgore also attended the event. Not pictured: Denso Foundation representative Amy Brock

The UT EcoCAR 2 team will continue work on the Malibu with a goal of achieving high scores at the Phase 2 Final Competition in Yuma, Ariz. and San Diego, Calif., which is tentatively scheduled from May 13-23, 2013.

General Motors provides production vehicles. components, seed money, technical mentoring, and operational support to EcoCAR 2. DOE and its research and development facility, Argonne National Laboratory, provide competition management, team evaluation, and technical and logistical support. In total. the fifteen competing teams have received \$745 million in vehicles, software, and support mechanisms.

For more information in the EcoCAR 2 competition, visit http://www.ecocar2.org/or follow the blog at http://www. greengarageblog.org/.



"I am so thankful to be a recipient of the John W. Prados Chemical Engineering Co-op scholarship. As required by the scholarship, I am majoring in chemical engineering and minoring in business administration while simultaneously completing a co-op with the Dow Chemical Company. Receiving this scholarship has reduced my financial burdens, allowing me to focus more on the rigorous engineering curriculum and to pursue other leadership and service positions on campus. I have been blessed with the opportunity to serve the University of Tennessee as a Resident Assistant, College of Engineering Ambassador, and Student Alumni Associate. I would not have been able to pursue these activities if I had not received financial support through this scholarship program.

I am incredibly grateful for this scholarship, not only for the monetary relief but also for the inspiration with which it has provided me. Without this scholarship, I would have never thought to pursue a business minor, but I have found that the business minor, in combination with my co-op, has greatly enhanced my education. I feel that I am now a more well-rounded individual with a better understanding of my discipline and the world around me. Following graduation, I plan on continuing my career in the chemical industry, eventually transitioning into management and pursuing an MBA. Overall, becoming a John W. Prados scholar has given me the opportunity to gain leadership skills both on-campus and in the 'real world,' helped me to find my passion in industry, and set me up for a successful career doing what I love."

> Rebekah Patton '14 John W. Prados Scholarship Recipient

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KNOXVIL

# **Alumni Profile:**

# **U.S. Air Force Major General Mike Holmes**



U.S. Air Force Major General Mike Holmes

U.S. Air Force Major General James M. "Mike" Holmes (BS/EE '81') often tells people that he was "raised" by the University of Tennessee, Knoxville.

Holmes was born in Springfield, Tenn., but his family relocated to Knoxville in 1962 when Holmes' father Clyde Holmes, a 1956 graduate of UT, accepted a position as the manager of the university's Dairy Experiment Station on Alcoa Highway. Holmes grew up on the peaceful grounds of the farm, which fronted on Lake Loudon. He attended UT kindergarten on campus and Fort Sanders Elementary, while Holmes' mom, Connie, worked at Crouch Florist on Cumberland Avenue. After elementary school, Holmes attended Tyson Junior High School and West High School.

"I was always within walking distance of the UT campus," Holmes said. "I had a News-Sentinel paper route between Cumberland Avenue and Shelbourne Towers."

Holmes' relationship with the legendary Neyland Stadium was

"My checklist at Neyland Stadium is nearly complete," he said. "Over the years, I sold soft drinks and programs, worked at sports camp, played high school and junior varsity football, performed on the banjo at halftime with the band, and flew an F-15 overhead as part of a pre-game flyby. I was also a walk-on with the football team during the 1975 season and played without any distinction."

Holmes' chemistry and physics teacher at West High, Bill Baird, encouraged him to take the engineering aptitude test at UT. Holmes did well on the test and enrolled in the engineering college after graduating from high school. He entered the Cooperative Education Program during his sophomore year and was assigned a job with NASA at the Kennedy Space Center in Florida.



General Holmes and a comrade raise the UT flag in Afghanistan.

"I was a huge fan of NASA's space programs as a kid-I kept scrapbooks stuffed with newspaper clippings and followed every mission," Holmes commented. "I remember CBS interrupting their schedule to announce the Apollo I fire, reading about the Apollo 13 explosion and recover, and trying to stay awake to watch Neil Armstrong's first steps on the moon."

The NASA assignment renewed Holmes' interest in space travel, and he also learned to fly in Florida through the Patrick Aero Club, a facility where non-flying members of the Air Force and government employees could learn to fly at reduced rates.

Holmes cites three important mentors who guided him as he decided to enlist in the Air Force.

"Ed Morgan was a UT engineering graduate, member of the 1951 national championship football team and my boss at NASA. Ed, along with Dr. Bodenheimer and the late Dr. Blalock, also helped me to learn the work ethic and habits required to be a success and helped me to see what I was capable of achieving," Holmes said.

Holmes went through the Air Force Undergraduate Training, F-15 Replacement Training, the F-15 Fighter Weapons Instructor Course and teaching and leading in F-15 fighter squadrons during his initial years in the Air Force.

Along the way, Holmes earned three master's degrees while on assignments for the Air Force, including a Master of Arts degree in history from the University of Alabama, Tuscaloosa; a Master of Airpower Arts and Sciences degree, the School of Advanced Airpower Studies, Air University, Maxwell Air Force Base, Alabama; and a Master's degree in national defense studies from the Naval War College in Newport, R.I.

Holmes has achieved incredible success during his military career, including promotions to Brigadier General in 2008 and Major General in 2011. He has received the Defense Superior Service Medal, the Legion of Merit with oak leaf cluster, the Bronze Star medal, the Defense Meritorious Service Medal with two oak leaf clusters and the Air Medal with three oak leaf clusters.

"I've enjoyed all of my assignments, but the ones that I have spent in command were the best. I've been fortunate to command an F-15 fighter squadron in Virginia, a pilot training group in Mississippi, and two wings-the 4th Fighter Wing flying the F-15 and A-10 in North Carolina, and 455th Expeditionary Wing flying fighter transport, electronic combat, and remotely piloted aircraft and rescue helicopters in Afghanistan," Holmes said. "I'll always remember the incredible motivation and skill of the men and women I worked with during a year in Afghanistan to safeguard the civilian population and protect coalition forces."

Holmes still enjoys working in the Air Force and looks forward to new challenges. He and his wife Sara, a successful children's book author, plan to make their home in Washington, D.C., once he leaves the service. Their daughter, Rebecca, is a graduate of the University of North Carolina-Chapel Hill and has just finished her first year in the physics PhD program at the University of Illinois-Champain/ Urbana, where she is a research assistant. The Holmes' son, Wade is a senior at UNC-Chapel Hill.



General Holmes (center) with his wife. Sara and his father, Clyde (right) and mother, Connie (far right) at his 2-star pin-on.

# **Development Update**

# Top 25 and the Philanthropy Equation



Dorothy Bryson, Senior Direct of Engineering Development

Inspired by the dreams of students to get a great education;

Advanced by faculty who are simultaneously mentors and catalysts for discovery;

Our journey to be recognized as a Top 25 Public College of Engineering is moving on every dimension.

That journey becomes more vibrant with every gift from every donor. The list of names that follows tracks only the gifts and new pledges made this past year, but gifts have a way of reverberating across years. Many additional donors are in the middle of pledges made during The Campaign for Tennessee. Because donors stepped up, the Min H. Kao and John D. Tickle Buildings will inspire learning. Others have put us in their estate plans for the future.

The true philanthropy equation is determined in the people whose lives are influenced for good by the gifts of many.

Then there are the endowments-two hundred twenty-nine of them in engineering, each one generating income every year to be given as directed by the donors. These invested funds are permanent legacies that offer story after story of achievement and will continue to do so as long as there is a University of Tennessee. Let me share just a few examples of long-term impact.

Since 1981 the Allen & Hoshall, Inc. Engineering Faculty Award has been given annually to outstanding faculty; that's thirty-one years that faculty excellence has been celebrated. Multiply that by the students touched by those faculty members; the impact is on hundreds of lives.

Willis Lincoln graduated from UT engineering in 1922. Seventy years later engineering received \$500,000 gift through Trusts in Mr. Lincoln's estate that created an endowment. Fast-forward twenty years: over \$500,000 in earnings have

benefited the college and the endowment has a current value of over \$760,000 which continues to produce annual income.

In 1938-one hundred years after the first engineering courses were taught at the University of Tennessee - Mr. J.E. Lopez established a scholarship endowment in the name of his father-in-law Colonel Samuel Henry Lockett. That's seventy-four years of continually supporting students, recognizing academic achievement, and helping students with financial need.

"Numerous friends and colleagues of Professor W.O. Leffell, being deeply interested in continuing his good work, hereby establish the W.O. Leffell Scholarship." So reads the 1977 agreement that established this endowment. It has indeed continued Professor Leffell's work – a financial legacy alive today in each Electrical Engineering student who holds this award. Good work that lives on, touching lives today and tomorrow.

The **Spikard Family Scholarship** originated with a gift in 1986 from someone who understands the power of gifts. As Associate Dean of Engineering Andy Spickard's duties included development activities. He also understands the power of investment capital-before coming to UT he was president of Alcoa Construction Systems. Every year since, Mr. Spickard has given to help it grow. Matching gifts from ALCOA augment each gift, further multiplying its potential. This year the 119<sup>th</sup> student will be helped through this generous endowment.

So what is the Philanthropy Equation? I would write it something like this:

One gift
+ more gifts
+ many gifts of every size
X years of giving
+ endowment income
X years of earnings



# **College of Engineering Donor List**

On behalf of the students, faculty, administrators, and staff of the College of Engineering we offer thanks to those named in the following lists. Your support helps propel our vision and we are grateful to each of you.

# The Dean's Circle 2011

Note the Dean's Circle is counted on the calendar year. All other giving totals in this report are for the fiscal year July 1, 2011 - June 30, 2012.





Leadership annual giving is recognized in the College of Engineering by our newly created Dean's Circle. We are grateful to the donors who are leaders in giving to the College Fund for Engineering and engineering department funds.

# **Engineering Annual Giving Total 2011 \$532,026**

Listed here are those who gave to engineering annual funds at leadership levels.

# **Engineering Annual Funds Leadership Levels**

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### Fiscal year 2012 donors July 1, 2011 - June 30, 2012

### **Outright gifts**

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# Gifts, Pledges and Pledge Payments By Degree

Shek Hong

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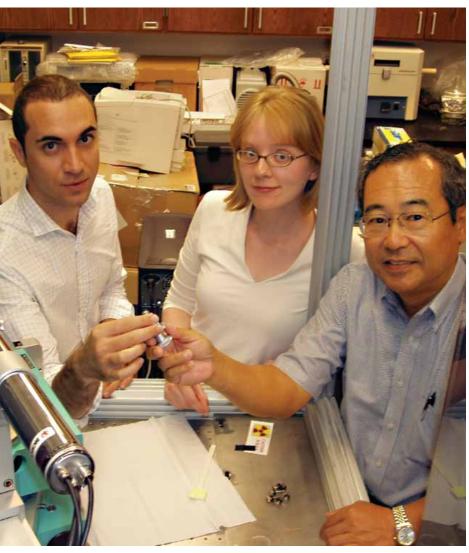
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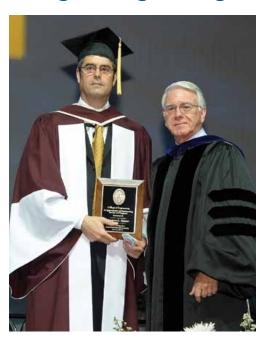
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# **Events & Awards**

# **College of Engineering 2012 Commencement**



Dr. Thom Mason (left) receives a plague from Dean Wayne Davis (right) to commemorate his role as keynote speaker for the COE 2012 Commencement.

The College of Engineering Spring 2012 graduation ceremony took place on Wednesday, May 9, with over two hundred and eighty engineering graduates participating in the ceremony. A group of approximately two thousand five hundred parents, friends, and relatives attended the event, which took place in Thompson-Boling Arena on the UT-Knoxville campus at 11:30 a.m.

Dr. Wayne T. Davis, dean of engineering, and Dr. Susan Martin, University of Tennessee, Knoxville, provost, led the academic procession that signaled the beginning of the ceremony. The procession included associate deans, department heads, and faculty representatives.

Dr. Thom Mason, the director of Oak Ridge National Laboratory (ORNL) and president and CEO of UT-Battelle, was the commencement speaker. Dr. Mason received his PhD from McMaster University in Hamilton Ontario, Canada. He joined ORNL in 1998 as scientific director for the U.S. Department of Energy's Spallation Neutron Source (SNS) project. Dr. Mason

was named a Fellow of the American Association for the Advancement of Science in 2001, a Fellow of the American Physical Society in 2007, and a Fellow of the Neutron Scattering Society of America

The college's top students, Karl Christian Bentjen, a computer engineering major; Emmabeth Parrish, a materials science and engineering major; and Jonathan Phillips Weigand, a civil engineering major, were recognized.

In addition to the commencement activities, the event also featured an ROTC ceremony, where Lt. Colonel Brian Delamater, a professor of aerospace studies at UT, officially commissioned five COE graduates into the U.S. Air Force. The new second lieutenants are Shaun Brennan Hooker, Justin Tyler Knott, Michael W. Peterson, Eric Stephen Roe and David Clinton Spencer.

In recent years, the university's colleges have been conferring diplomas during smaller, more individualized graduation





Engineering students are officially commissioned into the U.S. Air Force during the ceremony.

# **COE PhD Candidate Attends Nuclear Engineering Student Delegation**



Lily Crabtree, a PhD candidate in the Department of Nuclear Engineering, was in Washington, D.C., July 21-27 as part of the 2012 Nuclear Engineering Student Delegation (NESD). Every year, about ten of the nation's brightest students head to the nation's capital to discuss the issues facing nuclear energy, policy, education, and research with key policymakers. Crabtree met with the science and energy representatives from both Senator Lamar Alexander and Senator Bob Corker's offices, and also conferred with members from the Tennessee delegation in the US House of Representatives. The NESD delegation also lobbied members of Congress

to support funding for nuclear engineering education, including scholarships, fellowships, and faculty development programs. The delegation provides a student perspective on policy questions related to nuclear science and technology through a written policy statement and meetings with government leaders. Crabtree completed her master's degree in nuclear engineering at UT in December 2011.

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# **Events & Awards**

# Living Light House On Exhibit at Smithsonian Folklife Festival



Karl Hughes discusses the Living Light House with visitors at the Folklife Festival.



Steven Davis at the Living Light House.

Living Light, the solar-powered house of the University of Tennessee, Knoxville, was one of only seventeen projects chosen to represent the nation's land grant universities at the Smithsonian Folklife Festival, which took place on the National Mall in Washington, D.C., June 27 to July 1 and July 4 to 8. The ten-day event was cosponsored by the National Park Service.

Living Light is a functioning, energy-efficient, solar-powered house that competed at the 2011 US Department of Energy Solar Decathlon. The house placed eighth overall in the event, and was the only house from the competition to be featured at the Smithsonian festival. It also placed third in the engineering category of the competition, a remarkable achievement against high caliber teams from universities in Florida, Canada, China, New York, and New Zealand.

Karl Hughes and Steven Davis, both undergraduates in mechanical engineering, maintained the mechanical systems of the house throughout its stay on the National Mall. The two students offered answers to technical questions about the house, which was wholly self-sustained by solar power throughout the event, posed by the nearly sixteen thousand visitors who toured the home at the festival.

The festival commemorates the 150<sup>th</sup> anniversary of the Morrill Act, which led to the founding of land-grant universities and allowed rural and working-class Americans better access to higher education. The focus of this year's event was to show an array of ways that universities and the Department of Agriculture put research to action every day.



The Living House was toured by over sixteen thousand people.

# **COE Student Selected to Attend SWE Global Innovation Symposium**



Janelle Dunne

Janelle Dunne, a senior industrial engineering major at UT, has been selected to attend the Society of Women Engineers (SWE)-Women Engineers Leading Global Innovation Symposium. SWE is convening a diverse group of women in engineering and technology for a two-day symposium to be held in Bangalore, India. This symposium will provide a forum for discussing engineering developments and challenges across engineering disciplines and countries, focusing on professional development, systems engineering, sustainable energy, and information technology and takes place August 29-31, 2012.

"The Women Engineers Leading Global Innovation International Symposium is an event that will benefit me in many ways," Dunne said. "The symposium experience will enhance my educational goals by allowing me to disseminate the undergraduate projects that I have worked on. I will receive in-depth feedback from professionals and professors who can provide direction into

constructing a research project. This event will also introduce me to new technology and innovations that will enlighten me as a professional. and will ultimately allow me to build a network with female engineers, professionals, and students."

The symposium features keynote

speakers and invited technical speakers, panels, workshops, technical posters, and opportunities for global collaboration. To facilitate an environment for collaboration, the total number of participants will be limited to seventy, with thirty-five participants from each country (India and the U.S.) that will include a mix of participants from academia and industry. Dunne was one of the ten students selected to attend the symposium. For more information on the program, please visit the following URL: <a href="http://alltogether.swe.org/blog-mobile/international-symposium-opportunity-for-us-engineering-students.html">http://alltogether.swe.org/blog-mobile/international-symposium-opportunity-for-us-engineering-students.html</a>

# **Events & Awards**

# **New Solar Secure Device Installed on Engineering Campus**



The Solar Secure Sunstation on the engineering campus.

The University of Tennessee, Knoxville, College of Engineering's campus got a boost in security when the new Solar Secure SunStation was officially unveiled on July 12. UT is the first university to install Solar Secure. The structure is located just outside Perkins Hall, the college's administrative building.

The net-zero energy Solar Secure SunStation provides Wi-Fi connectivity, security, shelter, lighting, and benches for seating. It is a solar powered, wireless structure that serves as a self-sufficient power and communications source for video surveillance, LED lighting, Wi-Fi, and an Emergency Assistance Station. It generates all of the energy it needs from solar panels and incorporates batteries for energy storage, ensuring uninterruptible power and communications capabilities in the event of an outage or other emergency. The SunStation also features a power outlet, allowing students the convenience to stay connected by using their laptops, cell phones, and other technology outdoors.

UT was selected as Solar Secure's first higher education installation due to its progressive energy efficiency and sustainability initiatives.

Cochran in Seattle, Wash. developed Solar Secure to overcome barriers of environmental impact and the high cost of installing

surveillance cameras and other security infrastructure on campuses. Although the technology was developed in Washington State, Cherokee Millwright and Mechanical in East Tennessee manufactured the UT station.

For more information, visit www.solarsecure.net.



# **Alumni News**

### COE Alumnus and Board of Advisors Member Named President of AWS



Nancy Cole

Nancy C. Cole (BS/MetE '63, MS/MetE '88) the current vice president of the American Welding Society (AWS) will assume the office of president and chairman of the board on January

During her term, Cole will lead the affairs of the society and will preside at all board of directors and executive committee meetings, as well as the society's annual meeting and any special meetings of its members. Cole will represent AWS at many of its local section meetings and other technical, national, and international meetinas.

Cole is an AWS Fellow, a Life Member, and a registered Professional Engineer in the state of Tennessee. She has chaired the AWS

Technical Activities, Fellows, and C3 Brazing and Soldering Committees, and has served on many other committees. Before forming her own company, she was program and contract manager at Oak Ridge National Laboratories.

AWS was founded in 1919 as a multifaceted, nonprofit organization with a goal to advance the science, technology, and application of welding and related joining disciplines. The international society has seventy thousand members worldwide. AWS leads the way in supporting welding education and technology development to ensure a strong, competitive, and advanced way of life for individuals around

# **Alumni's Legacy Lives On in Memorial Engineering Fellowship**



Dr. and Mrs. Hui Pih

In 2012, about a year after Dr. Hui Pih's passing, his wife, Mabel, and children came together to help keep his legacy at the University of Tennessee, Knoxville, alive. Dr. Pih believed in perseverance and self-reliance as core values to be nurtured in both his children and his students. The Dr. Hui Pih Memorial Engineering Fellowship will help keep these values alive in future generations. His kids took his saying, "don't just talk about it-just do it," seriously. And so sprang their joint decision to create an endowment at UT for their father at the college that is very important to the Pih family, now and

Dr. Pih joined the engineering faculty in 1965 and taught at UT for over twenty-five years before retiring.

"He loved exploring, learning, and teaching," says Shirley Pih Broadbery, creator of the Dr. Pih Memorial Engineering Fellowship. "I think that is why he became a professor."

Dr. Pih came from a bloodline of engineers and professors. His four children are no exception. All of them attended UT for a degree. Norman received his B.S. in chemical engineering and Shirley was an engineer major for two years before switching over to business. His other two children, Martin and Arlene, received pharmacy and business degrees, respectively. Arlene's husband, Mark Driver, also received a B.S. in civil engineering from UT.

Dr. Pih was a member of Tau Beta Pi (the organization's national headquarters has been based on the UT Knoxville campus since 1907) and this interest lives on in his son. Norman, who is on the National Executive Council of Tau Beta Pi.

Dr. Pih was a gentleman scholar who left his own trail of kindness and caring for others, whether for his immediate and extended family, friends, or departmental staff at UT. His children are following in his footsteps by continuing his legacy.

### 1960s

Curtis Siller, Jr. (BS/EE '66, MS/EE '67, PhD/EE '69) retired after a thirty-year career with Bell Laboratories. After working for two privately held companies, Cetacean Networks and Rivulets Communications, he currently operates his own consulting practice, Enginnovation. He specializes in patent protection and litigation. Dr. Siller has published more than seventy papers, edited one book and contributed to four others, helped organize more than thirty conferences, and is a past president of the IEEE Communications Society. He is a Bell Labs and IEEE Fellow with numerous industry and service awards. He has spoken at more than sixty international venues.

Richard Snead (BS/IE '73) became CEO and

President and CEO of Carlson Restaurants

Worldwide, Inc., the parent company of T.G.I.

### 1970s



Friday's Inc., from 1997 to 2009. He also previously served in executive positions with the commencement ceremony. Richard Snead

# Pick Up Stix brand and Burger King Corp. Snead, a former member of the COE's Board of Advisors, spoke at the College of Engineering's 2005

### 1980s

Joseph A. Ledford (BS/CE '80) was appointed chairman of the board for architecture and engineering firm Barge, Waggoner, Sumner, and Cannon Inc. at the company's 2012 stockholders' meeting. Ledford has served on the board since 2002 and is manager for the Barge Waggoner Knoxville office.



Marc Gibson (right) presents the Accomplished Alumni Award to Jorge Sotolongo.

Jorge Sotolongo (BS/IE '88) visited the UT Knoxville campus in March 2012 as part of the Accomplished Alumni program. He spoke to graduate students in Dr. Rupy Sawhney's Industrial Engineering 550 class. Afterward, he received the

Accomplished Alumni Award from Marc Gibson, Director of Corporate Development, and Eric Haag, Director of Alumni Programs. Sotolongo is the manager of the Engineering Research and Development Lab at Gulfstream Aerospace in Savannah, Ga.

# **Alumni News**

### 1990s



(MS/EM, IE '92) received the Women of Excellence Service Award from Sister Friends United, Inc., for her service during the organization's Five-Year Anniversary Red-Carpet Awards Gala in May 2012. She also Dr. Michele R. Wright received the group's

2010 Women of Excellence business award for the release of her publication "Dear Success Seeker: Wisdom From Outstanding Women."

The book features advice from numerous notable successful women. Wright, formerly Michele Wise, graduated in 1992 as the first full-time African-American student to earn a Master of Science degree in Engineering Management/Industrial Engineering from the UT Space Institute.

Wright has won several awards in pharmaceutical sales and consults as a "Success Guru" in project, team, and totalquality management. She lives in Little Rock, Ark., with her husband Terry G. Wright.



R. Slade Sevier (BS/ CE '95), a construction and real estate litigation attorney, joined Adams and Reese LLP's Nashville office as a special counsel

Colonel

Randolph

(MS/Aviation

Systems '02)

presented

the 46th

and test

pilot, flew as

the keynote

International

**Aviation Snow** 

R Slade Sevier

### 2000s



Colonel Randoph J. Bresnik

a mission specialist and completed two spacewalks for mission STS-129 of the space shuttle Atlantis to the International Space Station in 2009.

# **Memorials**

**Robert Lee Anderson** (BS/EngPhys '67) died on July 6, 2012. He was a resident of Spartanburg, S.C.

Romeo Balmores "Romy" Baylosis Sr. (MS/ CE '77, PhD/CE '88) died on March 4, 2012. He was a resident of Knoxville.

Clyde Donald "Don" Bean (BS/IE '55) died on June 28, 2012. He was a resident of Huntsville, Ala.

Peter G. Biliak (BS/ME '72) died on June 23. 2012. He was a resident of Knoxville.

Mark F. Cheng (MS/CE '68) died on March 4, 2012. He was a resident of Farragut, Tenn.

**Irvin Lacy Gentry** (*BS/CE '54*) died on March 1, 2007. He was a resident of Mount Airy, N.C.

Howard J. Hart (BS/EE '48) died on Sept. 11, 2011. He was a resident of Ashdown, Ark.

**Thomas M. Hastings** (BS/CE '49) died on July 12, 2012. He was a resident of Orlando, Fla.

James "Jim" Dickason Hoskins II (BS/ChE '62) died on Oct. 7. 2011. He was a resident

of Charlotte, N.C. He was the grandson of former UT president James D. Hoskins.

James W. Hutson (BS/IE '60. MS/IE '65) died on April 25, 2012. He was a resident of Farragut, Tenn.

Clyde V. Jenner (BS/IE '53') died on Jan. 14, 2012. He was a resident of Oak Ridge, Tenn.

Steve Lewallen (BS/ME '74) died on Feb. 21, 2012. He was a resident of Bristol, Tenn.

Wendell J. Long (Undeclared engineering '43') died on Sept. 23, 2011. He was a resident of Knoxville and Vero Beach, Fla.

John Richard "Dick" McDowell (BS/ME'50. MS/CEE '75) died on March 8, 2012. He was a resident of Flovd. Va.

Harry Allen Mixson (BS/EE '49) died on Aug. 12, 2012. He was a resident of Chattanooga, Tenn.

John Ingle Moffitt (BS/ME '60) died on May 2, 2011. He was a resident of Greenville, S.C.

# **Special Memorials**

The University of Tennessee, Knoxville College of **Engineering recently lost a current and three former** faculty members.



Software Engineering, a professor in the Department of Electrical Engineering and Computer Science and the director of the UT-ORNL Science Alliance, died on April 25, 2012. Poore received his PhD from the Georgia

Dr. Jesse Poore, the

Harlan D. Mills Chair in

Institute of Technology and came to UT in 1986 as chair of the Department of Computer Science.



Hardy Liston Jr.

Dr. Hardy Liston Jr., a professor of mechanical engineering who became the first African American member of the UT Knoxville central administration, died on July 10, 2012. Liston came to UT in 1970 as the assistant vice chancellor for academic affairs and later went on to be named associate vice

chancellor before retiring in 1990. Liston received his master's degree from George Washington University. Each year, UT's Commission for Blacks presents the Hardy Liston Jr. Symbol of Hope Award to faculty. staff, or alumni who have made outstanding, proactive contributions to the university and have promoted cultural diversity.



Dr. George Frazier, Jr., a professor emeritus in the Department of Chemical and Biomolecular Engineering, died on June 1, 2012. Frazier received his D. Engr. in chemical engineering at The Johns Hopkins University. After graduating, he received Dr. George Frazier, Jr. a one-year NATO post

Doctorate Fellowship to complete advanced studies at Cambridge University in England. Frazier then returned to the US, where he taught at Johns Hopkins until joining the faculty at UT, where he taught from 1968 until his retirement in 2000.



Dr. Joe Wilkerson

Dr. Joe Wilkerson, a professor emeritus in the Department of Mechanical, Aerospace and Biomedical Engineering, died on May 26, 2012. Wilkerson received his PhD from the University of Tennessee and was a professor for thirty-one years, retiring in 1999.

During his career, he participated in the flight-testing of the KV-135 refueling tanker and the development of the 747 propulsion systems. He was also an active commercial pilot and flight instructor.

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### Calendar

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Fall 2012	
1st Session Ends	Oct 10
Fall Break	Oct 11-12
2 <sup>nd</sup> Session Begins	Oct 15
Thanksgiving	Nov 22-23
Classes End	Dec 4
Exams	Dec 6-7, 10-13
Graduate Hooding	Dec 14
Commencement	Dec 15
Offical Graduation Date	Dec 15

Spring 2013	
Classes Begin	Jan 9
MLK Holiday	Jan 21
1st Session Ends	Feb 27
2nd Session Begins	Feb 28
Spring Break	Mar 22-28
Spring Recess	Mar 29
Classes End	Apr 26
Exams A	pr 30, May 1-3, 6-7
Commencement	May 8-10

### **Contact Information**

### Senior Administration

Dr. Wayne Davis, Dean of Engineering

Dr. Bill Dunne,

Associate Dean for Research & Technology

Dr. Masood Parang,

Associate Dean for Academic & Student Affairs

Departments	
Chemical & Biomolecular	974-2421
Civil & Environmental	974-2503
Electrical & Computer Science	974-3461
Industrial & Information	974-3333
Materials Science	974-5336
Mechanical, Aerospace &	
Biomedical	974-2093
Nuclear	974-2525

### Administration & Programs

Communications. .974-0533

Dean's Office	974-5321
Development	974-2779
Engineering Advising Services	974-4008
Engineering Diversity Programs	974-1931
Engineering Fundamentals	974-9810
Engineering Professional Practice	974-5323
Engineering Research	974-8360
Engineering Student Affairs	974-2454
Finance & Admin. Affairs	974-5279

Research Centers	
Materials Processing	.974-0816
Maintenance & Reliability	974-9625
Scintillation Materials	974-0267
Transportation Research	.974-5255
Intelligent Systems and	
Machine Learning	974-5803
CURENT	974-9720
Innovative Computing	
Laboratory	974-8295

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# **COLLEGE OF ENGINEERING**

On the Hill Catered by Dead End BBQ, co-owned by UT Electrical Engineering graduate Robert Nutt





The University of Tennessee, Knoxville, College of Engineering invites you to Homecoming 2012 and the Annual Alumni BBQ on the Hill.

### Saturday, November 3, 2012

3 hours prior to kickoff of the Tennessee vs. Troy football game.

Join us for a barbeque lunch, including hot dogs for the kids.

Enjoy exhibits and demonstrations, reunions with former classmates and faculty, and games for both adults and children. Tours of the Min H. Kao Building will be given.

Register today and be a part of the tradition.

Costs:

\$12.00/adults - \$8.00/children under 10 years of age

Register online at: www.volsconnect.com

For more information, contact Christina Parsons at (865) 974-2779 or email: cparson4@utk.edu