



SPRING 2017 • Alumni Newsletter



DEPARTMENT OF
MECHANICAL, AEROSPACE &
BIOMEDICAL ENGINEERING

**Student Team
Prepares to
Extract Ice
from Mars**
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From the Department Head



Thanks for taking a look at the spring 2017 issue of the Department of Mechanical, Aerospace and Biomedical Engineering (MABE) Alumni Magazine. I hope you enjoy it!

Progress continues on Rocky Top toward our goal of a Top 25 public program. The major news coming out of the university is the naming of the Tickle College of Engineering based on a significant contribution from 1965 Industrial Engineering graduate John D. Tickle. This generous support will be used by the college to support its continuing upswing. Just for some perspective, since 2006, the number of engineering students has grown from 1,600 to 4,300 this year. This year's freshman class has an average 4.0 GPA and a composite ACT score of 30. Doctoral students, meanwhile, increased from 200 in 2005 to 700 this year. Faculty has also grown 20 percent during this time.

In MABE, we have now hired 23 faculty in the past five years, including two Governor's Chairs, an Eastman Professor of Practice, the H.H. Arnold Chair in Aerospace Engineering, and two senior lecturers. Our department had a record value of new funding commitments last year, with this year's numbers tracking significantly ahead of that. Undergraduates in our programs now total over 1,200, with about 200 in aerospace, 250 in biomedical, and the rest in mechanical. For the first time, MABE has over 100 PhD students enrolled, which, per faculty, now puts us on par with our aspiring Top 25 peers. It is amazing to me that as recently as 2006, the entire college only had 200 more students than the total number of students that MABE has now. The best part about this, to me, is that it is not just growth; it is a complete commitment to enhancing quality everywhere you look. Not only are the incoming students the best we have ever had, but I believe the faculty are the most productive as well—they are giving students an opportunity to experience cutting edge research.

We remain committed to preparing the next generation of undergraduates for whatever comes their way. Our successes in research and the generosity of our alumni has provided essential resources: Our undergraduate labs are refreshed often, students have more opportunities for research experiences, and our senior design program now includes self-funded projects that help the surrounding community. One example of a community-based project is "pop-up playgrounds," designed for quick deployment in empty parking lots or other areas of the city that may benefit from more foot traffic and space for families to enjoy the outdoors.

Another tremendous source of pride for us is our Hall of Fame. Please read about the tremendous lives of our latest inductees Butch Wilmore and Mike Sawyers. They have had distinguished careers on Earth and in space, and they exemplify both the power of a Tennessee engineering degree, and the quality of character we celebrate within our Hall of Fame.

Finally, please keep sending us your pictures and sharing stories of your days at UT in Knoxville or at UTS! These stories often get the most response from alumni, so please send us some memories of your days at Big Orange!

Thanks again for taking the time to find out what's going on in MABE. I look forward to hearing from you and invite you to get in touch and stay connected.

Best regards,

Matthew Mench

@MABEDeptHead

Two New Members Added to MABE Hall of Fame



Michael Sawyers

This April, MABE added two new members to its Hall of Fame, including the founder and CEO of 7Delta and its second astronaut, Michael Sawyers

Sawyers graduated from UT with a bachelor's of science in engineering science and mechanics (biomedical engineering) in 1979. He has over 35 years of diverse executive management and operational medical information technology experience in support of the Department of Defense Military Health System and Department of Veterans Affairs Healthcare System.

In 1999, Sawyers retired from the US Army after 20 years of service as a lieutenant colonel while serving as a medical information systems officer. He served in various levels of responsibility within the Medical Research and Development Command, Military Health Systems, and the Department of the Army's Staff.

Sawyers was part of the UT Minority Engineering Program Year Group 2. He was named the 2012 Maryland Technology Entrepreneur of the Year, 2012 Minority Enterprise Advocate Magazine Entrepreneur of the Year, 2013 Small Business Administration Maryland Small Business Person of the Year, and 2013 CEO World Awards Customer-Focused CEO of the Year. He has also received several military awards.



Barry "Butch" Wilmore

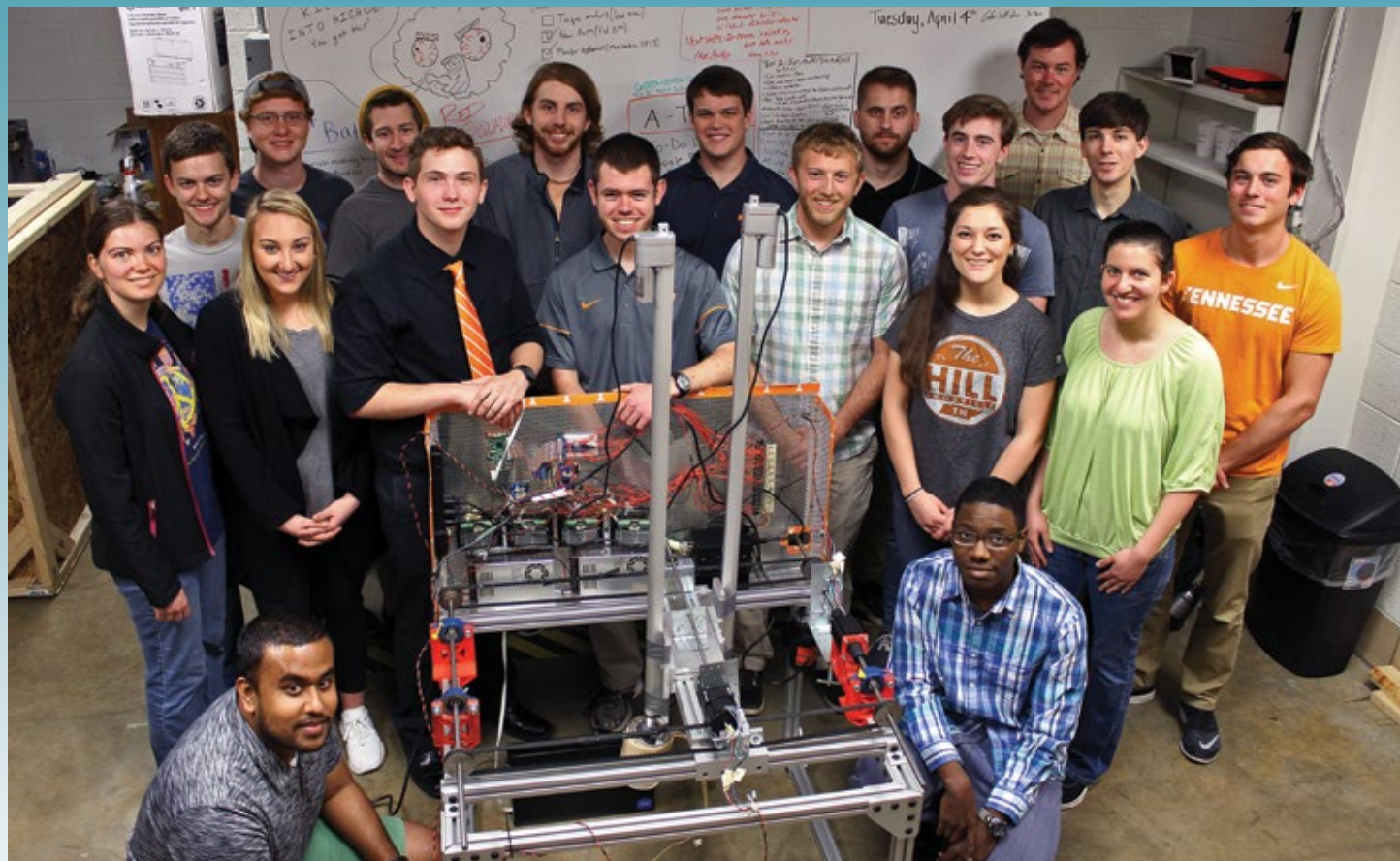
Barry "Butch" Wilmore received his master's in aviation systems from UT in 1994. He is a tenured fleet naval officer and pilot. He was selected as an astronaut by NASA in 2000 and has completed two missions to the International Space Station. Wilmore has logged 178 days in space and has completed four space walks. In 2014, he served as commander of most of his mission aboard Expedition 41/42. He is the first person to use a 3-D printer aboard the ISS, and assembled the first tool, a socket wrench, which he constructed entirely in space.

Wilmore has received numerous awards and honors, including the Defense Superior Service Medal, Legion of Merit, Defense Meritorious Service Medal, and a NASA Distinguished Service Medal. The US Atlantic Fleet named him the Light Attack Wing One Pilot of the Year in 1991 and Strike Fighter Aviator of the Year in 1999. Wilmore received his honorary doctorate from Tennessee Technological University in 2012 and received the Accomplished Alumni Award from UT in 2015.

Sawyers and Wilmore were officially inducted in to the Hall of Fame at the MABE Honors Awards Banquet on April 6.

Student Team Competes in NASA's Mars Ice Challenge

By Kathy Williams



The team with their prototype

A team of UT students is one of eight university teams that have been selected to participate in the Mars Ice Challenge, a special edition of NASA's Revolutionary Aerospace Systems Concepts—Academic Linkage (RASC-AL) competition for graduate and undergraduate students studying fields with applications to human space exploration.

Teams must assume the role of astronauts who monitor and control drilling operations on Mars. They must demonstrate a method to extract water from the large ice deposits believed to exist just under the surface of the red planet—deposits that may, one day, enable a sustained human presence on Mars.

The UT team, comprised of 21 students—most of whom are majoring in mechanical or aerospace engineering—received \$10,000 from RASC-AL to fund construction of their proposed robotic prototype.

“Being a part of this project is one of the most rewarding things I’ve done during my time here at UT,” said team member Caleb Peck. “Seeing this from beginning to end, and enjoying everything I’m doing, reminds me that I’ve made the right choice with engineering.”

MABE Assistant Professor Brett Compton is the faculty advisor for the team. “It is a pleasure to mentor this exceptional group of UT students,” said Compton. “It is particularly encouraging to see the level of responsibility, organization, enthusiasm, and creative thinking that they

display running the team and creating their design proposal. It is a daunting task to design a water harvesting system for the Martian environment, but the team has done a great job creating a design that uses the low temperature and pressure of the Martian atmosphere to their advantage.”

Compton will accompany four team members to the competition in June where they will present their concept to a panel of judges and demonstrate their drilling system on simulated Martian subsurface ice stations: solid blocks of ice covered with a mixture of clay and gravel approximately one meter deep. The team that can extract the most water from the ice station will win.

“I’m very proud and confident of this team and I think some of the schools that are RASC-AL veterans will be surprised with what UT engineering will bring to the table. We have an innovative, outside-the-box design which is what is needed when designing hardware for Mars,” Peck said.

In addition to the demonstration, each team is required to submit a technical paper and present a poster at the competition. The top two overall winning teams will receive a travel grant to present their concept at a NASA-chosen event.

The competition is in conjunction with the 100th anniversary celebration at NASA's Langley Research Center in Hampton, Virginia.

For more information, visit tiny.utk.edu/MarsIce.



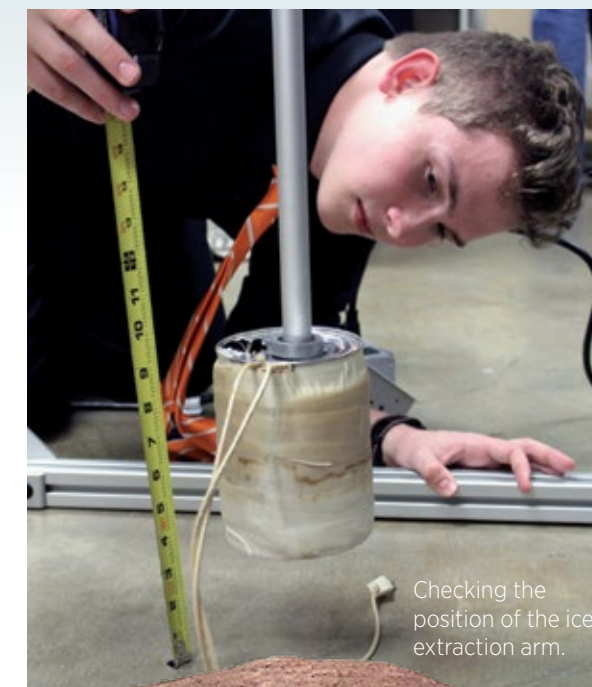
Team members adjust the extraction arm support.



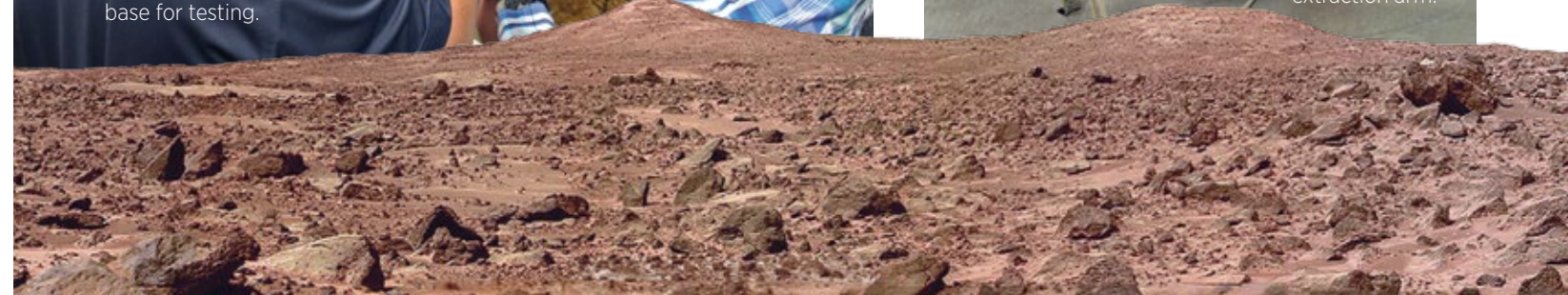
Team members discuss refining the trencher that must remove one meter of earth.



The team moves the rig atop a simulation base for testing.



Checking the position of the ice extraction arm.





Dean Wayne Davis, at left, and former UT Chancellor Jimmy Cheek, far right, joined Ann and John Tickle on the engineering campus courtyard for an afternoon celebration honoring the naming of the Tickle College of Engineering.

Tickle College of Engineering Named

The University of Tennessee Board of Trustees voted in October 2016 to name the College of Engineering for distinguished alumnus John D. Tickle. It marks the second time in the campus's 222-year history that a college has been named for an alumnus and benefactor. Tickle, a 1965 industrial engineering graduate from Bristol, Tennessee, is chairman of the Strongwell Corporation.

"My goal is for the University of Tennessee to be known for their education and the product they put out," said Tickle. "[My wife] Ann and I both believe that education is what fuels success—not just our own success, but the success of UT and the state as well. I'm deeply honored and will try to live up to the billing."

The naming and the foundation of support it reflects better align the college with its aspirational top-ranked public university peers. The college joins the Haslam College of Business as the only named UT Knoxville colleges, with benefits that extend well beyond the new name.

John Tickle began supporting UT just a year after he graduated. A recent transformational gift will impact every aspect of the college—from students and faculty to research and facilities.

"This is a historic day for our university and our state," said former UT Chancellor Jimmy G. Cheek. "We want to thank John, Ann, and the Tickle family. Their support will accelerate the college's bold plans for growth and improvements and the university's plans for becoming a top-ranked public research university."

Hundreds of students, faculty, staff, and alumni turned out on November 3, 2016, for an afternoon celebration to thank the Tickles at the plaza between Perkins and Ferris halls.

Excitement for the event was evident, with people lining up a full hour before the program began to get a free T-shirt with the college's new name and logo, all of which were quickly distributed.

"The Tickles' support will have an impact on our students, faculty, staff, and the engineering profession for many years to come," said Cheek. "Momentum gained by this naming will help us continue to make great strides in our journey to become a top-ranked public research institution. It shows that we have the will and the resources to prepare our graduates to compete in an ever-changing global workforce."

As part of the naming celebration, Tickle was presented with thank-you notes from many of the college's four-thousand-plus students, faculty, and staff. UT's current EcoCAR, a Camaro, was revealed with his signature on the door. He was also given a model of the EcoCAR—also with his name over the door.

The gift offers Dean Wayne Davis—and future deans—flexibility to use the funds in any way to enhance the college's excellence. Dean Davis has chosen initially to designate the funds for:

- The Tickle Graduate Fellows, which will fund doctoral students across all of the college's academic programs
 - Tickle Professorships to recognize excellent faculty, helping the college recruit and retain these important scholars
 - The addition of a team of professional advisors over the next year to provide more guidance to undergraduate students about their academic goals
- Davis said that naming the college enables the next big steps in its journey.

"It's all about you—the faculty, students, and staff—and my trust in you. Keep taking the school forward."

—John D. Tickle

"John and Ann want our students to have the very best education and experience here so that they will graduate as the most versatile and well-trained professionals in their industries," Davis said. "He's been a special partner in so much of the progress we've been able to make, and this gift will make a difference for our students, the profession, and our state for many years to come. It's a very special and historic day for the college and John's support means a lot to me, both as dean and as an alumnus of the college."

In the past decade, the college has grown its enrollment by 1,600 students, or roughly 60 percent. It has added 30 world-renowned faculty and nearly doubled its annual research funding to almost \$75 million. The college has risen more than 10 spots among public institutions to become the country's 32nd- and 33rd-ranked undergraduate and graduate engineering schools, respectively, in the annual rankings from U.S. News and World Report.

The quality of incoming students has also surged; current freshmen have an average GPA of 4.0 and math ACT score of more than 30.

The Tickle College of Engineering announced, in fall 2015, its part of the Journey to the Top 25 Campaign with a goal of \$150 million. John Tickle is chair of the engineering campaign committee, and to date over \$145 million has been committed.

"Leadership is the key, and John and Ann are tireless in their efforts to ensure that we have the financial base to propel this college forward," said Davis.

Tickle said that seeing so many changes across the campus gives him goosebumps. He considers the cranes, road disruptions, and new buildings a sign of the university's stability and health. He noted the contrast to the perception of the college just after he graduated, relating a conversation that angered but also inspired him.

At a lunch with colleagues once, someone asked where he had gone to school and he proudly answered, "the University of Tennessee."

"I'd hear a silence, and that really bothered me," said Tickle. "It's stuck in my craw for over 50 years."

Acknowledging that much has changed since then, he added, "When someone says 'I'm a University of Tennessee graduate' I want people to say 'Wow!'"

The Tickles have invested in many UT programs over the years, including support for professorships, building projects, and athletics initiatives. John Tickle was appointed to the UT Board of Trustees in 2015. The John D. Tickle Engineering Building opened in 2013, the John and Ann Tickle Small Animal Hospital opened in 2008, and the John and Ann Tickle Athletic Development Suite is a key feature of the Brenda Lawson Athletic Center, which opened in 2006.

The Tickles have committed a significant portion of the private dollars needed in the state's funding formula for an additional new academic building for engineering. The planned new building will house nuclear engineering, freshman engineering programs, and student design and innovation laboratories.

"This is hopefully a catalyst for the college," said Tickle. "It's all about you—the faculty, students, and staff—and my trust in you. Keep taking the school forward."

For Dean Davis the celebration and gifts were merely tokens of appreciation for the positive changes and growth the Tickles have helped fuel.

"John and Ann's support and partnership have been vital in our recent growth and in laying the foundation for us to be a successful college for years to come," said Davis. "As a dean, it's been fantastic to see those developments, but as an alumnus it means a lot to me personally, as well. This is the best time ever to be an engineer at or from the University of Tennessee."



John Tickle met with engineering students and posed for photos during the "Party on the Quad."



Engineering Ambassadors distributed hundreds of shirts emblazoned with the college's new logo.

Research Reveals Potential for 50-fold Increase in Renewable Hydrogen Production Efficiency

By David Goddard



Feng-Yuan Zhang

One of the stumbling blocks that has held back more widespread adaptation of certain forms of green energy has been the higher cost associated with first converting them to a usable fuel type.

Research being conducted by a joint team of researchers at UT and US Department of Energy national laboratories could soon change that.

Their work

has led to a new understanding of how and where electrochemical reactions occur, garnering them recognition from the American Association for the Advancement of Science journal, *Acclaim*.

That research—"Discovery of True Electrochemical Reactions for Ultrahigh Catalyst Mass Activity in Water Splitting"—has led them to design hydrogen-producing cells that increase the catalyst mass activity at a rate 50 times higher than previously possible.

This discovery may present opportunities to maximize the use of catalysts and significantly reduce the cost of what are known as proton exchange membrane electrolyzer cells (PEMECs). Their use could contribute to an affordable supply of renewable hydrogen as the US seeks to adopt more carbon-free forms of energy.

The main purpose of PEMECs is to split water into its components—hydrogen and oxygen—before filtering and collecting just the hydrogen. Among other advantages, these cells have a higher response rate and are more efficient and compact than previous cells.

"We discovered that placing the catalyst layer adjacent to good electrical conductors drastically increased

the performance," said Feng-Yuan Zhang, an associate professor within the MABE department and director of the Nanodynamics and High-Efficiency Lab for Propulsion and Power (NanoHELP) at the UT Space Institute.

The big change in the new approach was to move from traditional electrolysis technology to the new cells.

"With reactions taking place so rapidly at the center of PEMECs and at such a small scale, it makes it that much more difficult to observe. They are often masked behind other components," said Zhang.

In order to see the reactions taking place, Zhang and his team developed new innovative materials to give PEMECs a transparent membrane. The researchers fabricated a novel PEMEC by sputter coating catalyst on the liquid/gas diffusion layer, rather than spraying it in a uniform layer on the membrane.

"The work shows a potential pathway toward significantly reduced catalyst loading and reduced cost for electrolyzers, which has been a key impediment to their widespread implementation," said Matthew Mench, co-author and head of the MABE department.

Although the membrane of Zhang's new PEMEC performed slightly worse than a conventional PEMEC, the catalyst layer was only 1/1000th the thickness. This small difference resulted in a 50-fold increase in catalyst mass activity compared with conventional catalyst-coated membranes.

"Our partners at the University of Tennessee had an idea about how to improve the performance PEMECs," said Johny Green, now associate lab director for mechanical and thermal systems engineering at the National Renewable Energy Laboratory. "The collaboration made it possible to take it a step further, bringing together electrochemical research and advanced manufacturing expertise to improve the efficiency of producing and storing hydrogen."

Along with Zhang, Mench, and Green, other project collaborators include MABE research associate Jingke Mo and doctoral candidate Zhenye Kang as well as ORNL's Scott T. Retterer, David A. Cullen, and Todd J. Toops.

This work is supported by the DOE National Energy Technology Laboratory under Award Number DE-FE0011585 and was partially performed in the state-of-the-art Nanofabrication Research Laboratory at ORNL's Center for Nanophase Materials Science.

Preparing Students for the Field of Advance Manufacturing

UT received another boost in its growing role in advanced manufacturing, as a leading group of research centers named MABE Assistant Professor Chad Duty to a team focused on strengthening curriculum and student preparedness in that field.

Duty will join the newly created Expert Educator Team to help spread the growth of advanced manufacturing education through other colleges.

"Our role will be to work with researchers and industry partners to identify areas of need in advanced manufacturing, particularly with lightweight materials," said Duty. "We will then create a knowledge base and curricula surrounding those areas so that we can better prepare students for careers."

The three groups working together to back the idea—Lightweight Innovations For Tomorrow (LIFT), the Association of Public and Land-grant Universities (APLU), and the National Center for Manufacturing Sciences (NCMS)—selected Duty and five other leading experts to take up that task.

The six were chosen from LIFT research partners and APLU member institutions because of their ties to advanced manufacturing and a demonstrated history of innovation.

The team will be led by APLU Vice President for Economic Development and Community Engagement Jim Woodell and NCMS Senior Vice President Rebecca Taylor.

Duty said that exposure to the latest advanced manufacturing techniques is just one positive for UT. The ability to collaborate with other institutions is another significant benefit.

"Advanced manufacturing is delivering a variety of new, high tech products to our society every day," said Duty. "Designs are rapidly changing to introduce more features, better performance, increased reliability, and higher quality, while at the same time delivering it all at a lower cost."

"This helps strengthen our position in that field, and keeps the momentum we've built going."

That momentum includes the UT-led Institute for Advanced Composites Manufacturing Innovation—The Composites Institute, partnerships in several other advanced manufacturing or materials projects, and the selection of three joint UT-ORNL Governor's Chairs in the discipline.

For its part, the team will soon convene in an effort to identify where educational opportunities exist in current projects. Those findings will then be taken back to member institutions and used to implement new lessons and research opportunities.



Chad Duty

Babu Receives Awards for his Expertise

By David Goddard



Suresh Babu (center) with graduate student Michael Massey (left) and Deposition Science and Technology Group Leader for ORNL Ryan Dehoff (right).

Suresh Babu joined the college as the Governor's Chair for Advanced Manufacturing in 2013 and quickly established himself as a key player in UT's growing reputation as a leader in the field.

His efforts have not gone unnoticed. Babu recently picked up a bevy of awards for his expertise.

The American Welding Society (AWS)—of which Babu is a fellow—bestowed the 2017 Comfort A. Adams Lecture Award on him, one of its highest honors.

Named for the founder and first president of the society, the award was created in 1943 as a way to recognize a scientist or engineer who has brought new ideas to the field.

"It is nice to be honored, but it is more satisfying to know the work we do here is having a positive impact on students, on research, and on society," said Babu. "The whole team in MABE, including faculty and students, and in collaboration with ORNL associates, are making some very positive strides here at UT."

Considered a lifetime achievement award by the society, it is far from the first honor AWS has given Babu.

He was the recipient or co-recipient of William Spraragen Memorial Awards in 2011 and 2016; Warren Savage Memorial Awards in 2011, 2013, and 2014; the Adams Memorial Award

in 2012; and the William Irrgang Memorial Award in 2011.

The Adams Award is given to educators who have advanced the knowledge of welding, the Irrgang for advancing the science and technology of welding, and the Savage and Spraragen awards are in recognition of key papers being presented.

"Suresh has helped nurture our advanced manufacturing efforts from an already strong position into the widely-recognized program we have today," said Matthew Mench. "This honor is both well earned and well deserved."

Babu, who specializes in 3-D printing and joining novel materials, was also given the UT-Battelle Joint Faculty Award. In announcing his selection, ORNL recognized Babu's contributions to additive manufacturing, development of exascale modeling, spirit of collaboration, and leadership at both ORNL and UT.

That expertise has helped UT land partnerships in advanced manufacturing other universities and with agencies, such as the US Department of Energy and the US Air Force.

UTRF also helped recognize the contributions Babu has made to both his field and the university, naming him an Innovation Driver Award winner.

Vaidya Named Composites Person of the Year



When UT and ORNL welcomed Uday Vaidya as a Governor's Chair for Advanced Composites Manufacturing in 2015, they felt they were getting one of the top composites experts in the field.

Now, it's official.

The Society of Plastics Engineers (SPE) recently named Vaidya as their 2016 Composites Person of the Year at their annual Automotive Composites Conference and Exhibition.

"Being recognized like this a huge honor for me," said Vaidya. "It's very humbling to receive any honor, but when it comes from peers within your field it is all the more special."

The award publicly acknowledges a contributor who has provided significant aid to the SPE Composites Division, particularly during the prior year, and made broad contributions to the composites industry as a whole.

Vaidya plays a key role in the UT-ORNL partnership, both as Governor's Chair and through his ties to the Institute for Advanced Composites Manufacturing Innovation.

IACMI—the Composites Institute is a \$259 million public-private partnership that was announced by President Obama on a visit to East Tennessee in 2014.

Vaidya's expertise has been beneficial for UT and ORNL as well as IACMI, particularly in advancing the development of new materials for current vehicles, mass transit, and transportation of the future.

That expertise was a key reason for his latest honor, according to SPE Composites Division Chair Michael Connolly.

"We wanted to recognize his considerable contributions to the composites industry, including numerous patents, publications, and presentations," said Connolly. "He has a passion for engineering education and has mentored hundreds of young engineers who've now made their way into our industry, including over 60 masters and doctoral students."

Since arriving at UT, Vaidya has also helped organize a new SPE chapter and overseen the refurbishment of an engineering building for use in composites research.

In addition to his academic career, he has served as either lead or co-investigator on more than 100 projects ranging from defense to industrial composite use and has authored more than 500 journal articles or conference proceedings.

Department Notes



Wade Speaks at TEDx Event



Assistant Professor Eric Wade participated in the TEDx event held at the Clarence Brown Lab Theatre on the UT campus in February.

Since 2014, UT has hosted the event, which brings together “a vibrant mixture

of people, ideas, and experiences converge to spark connection and deep conversation,” according to the organization.

Wade spoke on “Technology for Motor Neurorehabilitation,” showing how everyday technology can become part of the solution to empower clinicians and improve lives for those dealing with a variety of medical conditions.

The TEDx event was created by the Technology, Entertainment, Design (TED) conference organization, which is centered on the concept of “Ideas Worth Spreading.”

View Wade’s talk at tiny.utk.edu/ericwade

Rucker Receives NSF CAREER Award



Assistant Professor Caleb Rucker has been awarded an NSF Early Career Development (CAREER) Award for his proposal “CAREER: Safe and Transformative Robotic Intervention through Dynamic Elastic Structures (STRIDE).”

The CAREER Award is the National Science Foundation’s most prestigious award in support of junior faculty who have the potential to serve as an academic role model in research and education.

The award includes a five-year grant that will help Rucker advance his research and become a leader in his field.

“I’m very grateful for this support and excited for the opportunity to pursue research which I hope will contribute to improving healthcare and STEM education by advancing knowledge in robotics,” said Rucker.

“This award is a tremendous honor for Rucker and the department,” said Matthew Mench. “This is further indication that he is an emerging leader in his field.”

Funding from the award begins in September.

Coder Appears on Jeopardy!



Alex Trebek and Jim Coder

Assistant Professor Jim Coder had his 15 minutes of fame last summer when he appeared as a contestant on *Jeopardy!*

Coder appeared on the June 16 episode, and despite coming in third place, played very well against a returning six-day champion.

The whole experience was surreal for Coder.

“I was awestruck when I heard Johnny Gilbert say, ‘This. Is. *Jeopardy!*’ and saw Alex Trebek walk out on stage, and then hearing Gilbert announce my name cemented the feeling of it being real,” said Coder.

“Being interviewed by Trebek was nerve-racking,” says Coder, who expected the conversation to be short and forced before moving on to the next contestant, but that wasn’t the case. Trebek was fascinated that Coder taught aircraft design and kept asking questions about it. The producers had to edit out over half of the interview for the airing of the show.

The first round of the game went well for Coder—he even found a Daily Double. But, the second round was more challenging.

“I started getting trigger-happy on the buzzer, and getting locked out of the clues I knew,” said Coder.

In Final Jeopardy, Coder had \$9,800, which would be a decent amount in most games, but it still left him in a distant third place. The last clue was tough and he missed the question, causing him to lose along with the six-day champion.

“When the taping was over it was a flood of emotions, from being sad that I lost, to still being awestruck that I had been there, to the realization that I will never have another chance to be on the show again,” said Coder.

His appearance on *Jeopardy!* will probably be Coder’s only attempt at gaining fame from a game show.

“I don’t know if I want to be on another game show,” said Coder. “Some former *Jeopardy!* contestants try their luck on other game shows like *Who Wants to be a Millionaire?*, but I don’t know if that’s something I want to do. To me, *Jeopardy!* is the top of the intellectual game shows.”

Coder joined the MABE faculty last fall after his appearance on *Jeopardy!*

TerMaath Creates WiSTAR3 Program for Women in STEM Fields



Assistant Professor Stephanie TerMaath has started a new UT program for women called WiSTAR3 (Women in STEM Advancing Research, Readiness, and Retention). The program aims to improve the retention rates of female graduate students who are in STEM fields. The program provides professional development opportunities and a support network through educational and social events to prepare students for careers in advanced research.

“Our nation is facing critical shortages in our STEM workforce, particularly in requiring advanced degrees. However, women continue to represent an extreme minority in many of these fields,” said TerMaath. “The goal of this program is to reduce that disparity.”

TerMaath developed WiSTAR3 as her leadership project when she attended the HERS Institute, a program that prepares women for leadership roles in higher education.

“I felt support and professional development opportunities for women graduate students in STEM is systematically lacking although it’s critical to retaining women with advanced degrees in STEM fields,” said TerMaath. “I created WiSTAR3 to fill in the gap.”

Since the kick-off event last spring, the organization has held networking meetings and workshops every month, with an average of 30 participants in attendance.

There are currently 137 members in their Facebook group.

TerMaath, who’s currently serving as the faculty director, attributes much of the program’s success to graduate students Ann Jennings and Mallory Ladd.

“I hope that this program will continue to thrive and serve as a model for other universities,” said TerMaath.

More info about WiSTAR3 can be found online at tiny.utk.edu/wistar.

Hu Receives UTRF Backing

The UT Research Foundation announced its 2017 winners for maturation funding and MABE Assistant Professor Anming Hu was among them.

Hu was honored for his work “Fabrication of flexible supercapacitors using 3-D techniques” and will receive \$15,000 in backing from UTRF to further explore his research ideas.

The foundation awards grants each year through the maturation funding program to help researchers advance new technologies on the path to market.



Mench Named SEC Academic Leadership Development Program Fellow

Professor and Department Head Matthew Mench was among four UT faculty members selected to participate in the 2016-17 SEC Academic Leadership Development Program.

Fourteen universities of the Southeastern Conference participated in the program, which aims to identify, prepare, and advance academic leaders for roles within SEC institutions and beyond.

As part of the program, Mench attended three-day workshops at the University of Alabama and Mississippi State University.

“The workshops were an outstanding way for me to get to know key administrators across all disciplines in the SEC and discuss emerging issues we all face,” said Mench. “The range of perspectives and network of trusted colleagues gained from this experience will help me lead the department forward for years to come. I am very grateful to have been accepted into this program.”



Kihm and Shin Publish in *Nano Letters*

Magnavox Professor Kenneth D. Kihm and Assistant Professor Seunggha Shin have been published in the prestigious journal *Nano Letters* on “In-Plane Thermal Conductivity of Polycrystalline Chemical Vapor Deposition Graphene with Controlled Grain Sizes.” It’s the first experimental study to probe the grain size effect on graphene thermal conductivity. The thermal conductivity of polycrystalline graphene was significantly reduced (from 5500 W/m×K to 680 W/m×K) when the grain size was decreased from infinite down to 0.5 μm. Kihm and Shin also theoretically elaborated this effective control through the ballistic size effect and grain boundary scattering.

The published work is based on international collaboration with Seoul National University in Seoul, South Korea, where Kihm has advised multiple graduate students as an adjunct professor.



Kenneth D. Kihm



Seunggha Shin

Student News

Kishore Presents Research at Legislative Plaza



Ernest Brothers, associate dean of the UT Graduate School, and Vidya Kishore pose with Kishore's poster at Legislative Plaza.

On February 8, graduate student Vidya Kishore represented UT as part of Graduate Education Week at Legislative Plaza in Nashville. She was the sole representative from the university at the event.

During a poster session, Kishore talked with legislators and government staff about her research on polymer additive manufacturing.

"It was a great experience talking about my work and it was very encouraging to see the level of interest in manufacturing in Tennessee," said Kishore.

The event was organized by the Tennessee Conference of Graduate Schools.

Kishore is a third year PhD student in the Bredesen Center and is pursuing a degree in energy science and engineering with Associate Professor Chad Duty as her mentor.



Scholarship named in Joshua Dobbs's Honor

UT's North Atlanta Alumni Chapter has named their annual scholarship in honor of Joshua Dobbs.

The chapter wanted to honor Dobbs for his success in the classroom, community service, and embodiment of UT's Torchbearer creed to light a path for others.

The R. Joshua Dobbs Scholarship will provide financial assistance to North Atlanta-area students who attend UT.

The chapter is currently trying to raise \$25,000 to endow the scholarship.

The Dobbs family will establish the criteria for future scholarship recipients.

Tech Carnivol hosts competitions at Engineers Day



On October 20, Tech Carnivol, a science and engineering festival designed and organized by UT students to help spotlight STEM education and its impact beyond engineering, held its second annual festival. Held in conjunction with UT's Engineers Day celebration, Tech Carnivol hosted competitions in robotics, business and physics.

One of the highlight events was Roborage Arena, a robot war in which teams remotely operated their robots to battle with each other and take control of the arena. In order to accumulate points, the robots had to turn off a set of lights. To slow down their opponents, the robots could choose to turn on the other team's set of lights. This unique competition, designed by UT's American

Society of Mechanical Engineers, attracted student participants from UT, the University of South Carolina, and various high schools from Alabama and Tennessee to compete for a \$1,200 cash prize. Out of the eight teams that entered, a team from Oak Ridge High School won first place.

In another event titled "Houston, we have a problem!" student teams were tasked with building craft boats that can travel a set distance using different propulsion techniques with a set of provided materials such as foam boards, paper clips, bar soap, balloons, disposable spoons, and rubber bands. A team of two students from UT that built and demonstrated boats that can travel with seven different propulsion techniques won the competition.

The festival also included an elevator pitch competition in which students get just 90 seconds to present their business idea to a potential "investor," and an autonomous robotics competition in which robots must complete a course, quickly and autonomously.

In total, awards worth \$3,000 were given to winners.

Tech Carnivol's student organization would like to thank its corporate sponsors MAHLE and Pololu, the Department of Mechanical, Aerospace, and Biomedical Engineering, the Engineering Entrepreneurship Program, and the Student Programming Allocation Committee who helped sponsor the event from the university's side. The organization also recognizes the help and support offered by over 40 students who were involved in organizing this festival.

Students from Across Tennessee Take Part in Engineers Day

On October 20, 2016, the Tickle College of Engineering was abuzz with activity as the annual Engineers Day festivities brought more than 1,500 students from across the state to campus.

Dave Wilson, vice president at National Instruments, kicked the day off with an address at Thompson-Boling Arena.

Wilson highlighted the various academic- and career-related thrusts of engineering and how students following those paths can change the world.

"One of the big questions you have is how can I make a difference," Wilson told the students. "Your answer is part of that question: 'I make a difference'.

"Through engineering, you can do many things that will impact your world."

Competitions such as egg drops, penny boat races, and bridge building helped introduce the students to various concepts, and principles of engineering were designed to engage them as much as possible.

Additionally, more than 30 student groups from UT were on hand to answer questions and provide feedback to their visitors.

The college has now held Engineers Day each October for more than a hundred years, helping the current generation of students ensure that the next classes are excited, engaged, and informed.



A member of UT's EcoCAR team talks to prospective students as part of Engineers Day.

Ashraf Gandomi is Invited to Join Gamma Beta Phi Engineering Society

Yasser Ashraf Gandomi, a graduate student in MABE, is a new member of the UT Chapter of the Gamma Beta Phi Engineering Society.

To be considered for membership, which is by invitation only, students must complete 12 hours of graduate work and rank among the top 15 percent of graduate students at the university. Students must also be committed to excellence in education, good character, and service.

As a member, Gandomi is expected to participate in projects, meetings, and other activities held by the chapter throughout the year. To maintain his membership, he must retain a grade point average within the top 25 percent of his class.

Gandomi is pursuing his PhD in mechanical engineering under the direction of his advisor, Matthew Mench, and is a member of the Electrochemical Energy Storage and Conversion Laboratory.



Nature Publishes UT Graduate Student's Work

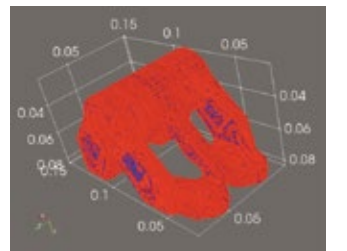
UT has rapidly become a leader in advanced manufacturing through interdisciplinary research focusing on both science and technology of manufacturing. So it shouldn't be a surprise that a researcher working with both UT and ORNL had his work published in *Nature's* highly regarded *Scientific Reports*.

What makes this work different is that its author isn't faculty, but a student—Jacob Raplee, a graduate research assistant in both mechanical engineering and business administration. Raplee authored a report on a new way of in-situ monitoring of electron beam additive manufacturing.

That work caught the attention of both *Nature* and Governor's Chair of Advanced Manufacturing Suresh Babu. "This is indeed a big achievement for Jacob, for UT, and for ORNL," said Babu. "It demonstrates to current and future students how coming to East Tennessee and working with top facilities and researchers at both institutions can really benefit you.

"If you come here, you can push the boundaries of advanced manufacturing while mastering the state of the art innovations in design for manufacturing, advanced processes, in-situ and ex-situ characterization, high performance computational modeling, and supply chain."

Raplee's paper, "Thermographic Microstructure Monitoring in Electron Beam Additive Manufacturing," confronts one of the common problems in manufacturing using that technique: the uncertainty surrounding the structure and strength of the manufactured material.



That uncertainty arises because of fluctuations in thermal gradients and liquid-solid interface velocity between material as it melts, which affects the accuracy of monitoring efforts.

Raplee developed a way to use infrared monitoring to bypass some of those issues, resulting in more accurate measurements and a more robust structure.

"By employing the method I proposed, we can distinguish between thermal patterns and interpret that data using known behaviors to determine a more accurate state of the material," said Raplee. "More testing is needed, but it's a promising start."

Raplee's paper can be read at tiny.utk.edu/raplee.

DEAN'S LIST FALL 2016

Summa Cum Laude

Aerospace Engineering

Benjamin C. Barnhill
Emily A. Beckman
Camille E. Bergin
Braxton Brakefield
Jared A. Carnes
Zane Chapman
Gary L. Collins
Zackery C. Crum
Adam C. Dalton
Sean M. Darling
Timothy L. Grizzel
Hannah M. Hajdik
Brenton W. Ho
Seth R. Holladay
William A. Huffman
Ryan E. Kelly
David M. Kight
Ethan Long
Jacob A. McCoy
Gillian S. McGlothlin
Matthew F. McVey
Willie N. Parker
Daniel A. Perling
Jared E. Pyron
Chapel R. Rice
Nathan G. Stover
Christopher W. Violet
Stewart R. Whaley
Arianna Worthy
Joseph T. Wray

Biomedical Engineering

Sara B. Aboeleneen
Jessica M. Barb
Owen H. Barbour
Taylor A. Berger
Seth E. Bowers
Samantha Z. Bratcher
Adam M. Cable
Morgan R. Chamberlin
William P. Davis
Simran Dayal
Kyle M. Elich
Jordan A. Failla
Hailey M. Fisher
Margaret A. Fraser
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Madison P. Gerlach
Cameron A. Goodman
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Lauren T. Jennings
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Justin R. Kilmarx

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Lakin B. Light
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Anna Morgan Mills
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Jarrod K. Nachtrab
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Micahel J. Potter
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Elijah D. Smith
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Christian A. Waksmunski
Eric D. Whitmore

Mechanical Engineering

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Ahmed Alyousef
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Nicholas J. Beuchat
Dylan W. Beverly
Adit Bhandari
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James D. Blanks
Bradley M. Bloedorn
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Nathaniel C. Brandt
Carter W. Breeding
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Timothy A. Campbell
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Amy L. Carpenetti
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Courtney T. Cartwright
Dakota Cauthen
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Jia Rong Chong
Eric Clark
Jared J. Colburn
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Nicholas R. Collins
Derek L. Cooper
Jay A. Crist
Kathryn H. Culhane
Nicklaus W. Curtis
Mary E. Daffron
Adam T. Daniel
Austin M. Davis
Robert K. Davis
Tanner C. Davis
Edward Deiderich
Garett M. Dessinger
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Ryan J. Durkee
Cooper M. Edenfield
Adam M. Edwards
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Richard H. Estey
James M. Ferguson
Lauren C. Fisher
Bryan Z. Fitzsimmons
James F. Fitzsimmons
Norman B. Forsythe
Christopher J. Fowler
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Hayden R. Galbreath
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Conner W. Godbold
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Clark A. Hall
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Caroline M. Hill
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Jared J. Hopland
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Magna Cum Laude

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Chad Batten
Samantha N. Golter
Max E. Hackenbrack
Gabriel C. Hatcher
Cole R. Keck
Joshua P. Kincaid
Donald J. Partin
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Austin Conley
Heather Critchfield
Lauren A. Crothers
Kara L. Delbridge
Micahel A. Harris
Brooks R. Hoddinott
Matthew R. Kushnir
Jenna M. LaColla
Mitchell J. Langley
Colin M. Mann
Andrew Miller
Allison J. Nelson
Bibhor R. Panta
Matthew T. Pickel
Kimberly S. Presentation
Natalie A. Reavill
Curtis T. Schunk
Robert K. Smith
Katherine E. Stiles
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Mechanical Engineering

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Hunter R. Kinslow
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William D. Wisdom
Maria L. Zemke

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Mitul N. Mistry
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Hunter M. Woodall

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Elliott C. Thurman
Bowen L. Wagner
Nathan S. Ware
Kenneth W. Washington
Andrew C. Welch
Jackson K. Wilt
Eric S. Wise
Shane C. Wood
Mason K. Wortman
Gennick J. Yoshioka



Photo Gallery



- (1) Students Tina Anjonrin-Ohu and Mary-Anne Nguyen manning the department booth at the BMES Conference last October in Minneapolis, Minnesota.
- (2) ExxonMobil representatives presented a grant check to Dean Wayne Davis at a luncheon on November 2. Toby Boulet (left) represented MABE at the check presentation.
- (3) MABE faculty having fun at their faculty appreciation party on February 27.
- (4) Dr. Toby Boulet talking with freshmen about MABE at the Spring Engineering Fundamentals Department Fair.
- (5) Joe and Anita Kelley present the diploma of MABE alumnus Gerald Francis Kelley (Joe's father) to the MABE department. The Kelleys have established the Gerald Francis Kelley and Lorraine Angela Maher Kelley Endowment in the department.
- (6) Department Head Matthew Mench and Vigor Yang, professor and head at Georgia Tech, during Yang's visit as a distinguished lecturer.
- (7) Matthew Mench and retired astronaut Scott Kelly during Kelly's visit to UT.



We need your help!

Our Professional Mentoring Program is growing and we need more mentors! If you have professional experience as an engineer, want to give back to MABE, have a desire to connect with our students, and help them prepare for professional careers, you can be a mentor. For consideration, sign up online at mabe.utk.edu/professional-mentoring-program/.

Attention Alumni! We Want Your Old Photos



MABE is collecting old photos that relate to the UT mechanical, aerospace, and biomedical engineering department. If you have any photos that are dated between the early 1900s and the 1990s, we would love for you to share them with us. The photos can be of your research, labs, you and your friends in MABE, projects, etc. Please send a digital copy to williamk@utk.edu. We look forward to rediscovering our past!

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The college celebrated being named the Tickle College of Engineering after distinguished alumnus John D. Tickle, *page 4.*