mabe

Fall 2018 • Alumni Newsletter

MECHANICAL, AEROSPACE & BIOMEDICAL ENGINEERING

Faster than a Speeding Bullet.

Revolutionizing Hypersonics.

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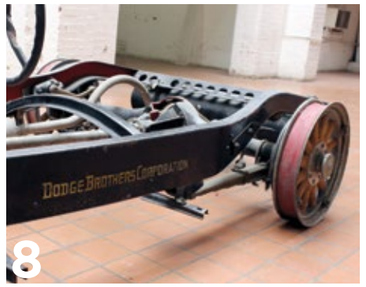

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mabe.utk.edu

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UTMABE

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University of Tennessee
Mechanical, Aerospace &
Biomedical Engineering

On the cover: UTSI's Wind Tunnel

From the **Department Head**

Thanks for reading the fall 2018 issue of our alumni magazine. I hope you enjoy it!

It's been a fantastic and record-breaking year for MABE in many critical categories. For the first time in history, all three of our graduate programs made the U.S. News and World Report rankings of public institutions. Mechanical came in at 40, aerospace at 27, and biomedical at 49. This is the first time our biomedical engineering program has been ranked, which is a reflection of our continually improving program (see p. 2). With new laboratory facilities in every major that enable and inspire creativity, design, and innovation, our undergraduates are equipped for success from day one. The generosity of our alumni and friends has absolutely empowered this transformation and includes over $10 million in direct monetary gifts and pledges since 2016 alone. The impact of this generosity will be felt for generations to come, and I want to thank everyone who has contributed. All gifts, small and large, have made a difference in our ability to shape the education and experiences of our students.

In this issue, you'll read more great stories about how MABE is having national impact. The United States faces a major challenge in the development of hypersonic flight vehicles to compete with large-scale efforts of other nations. UTSI's H. H. Arnold Chair in Computational Fluid Dynamics and B. H. Goethert Professor John Schmisseur is leading part of a $9.8 million project funded by the US Air Force Research Laboratory to explore the development and production of new materials and structures to enable hypersonic propulsion (see p. 14). The US Navy has chosen UT-ORNL Governor's Chair for Advanced Manufacturing Suresh Babu to lead a $7.5 million Multidisciplinary University Research Initiative (MURI) program. Babu and his team will focus on properties, defects, and instabilities in advanced manufactured alloys—an area of great importance to the Navy as well as many other industries (see p. 6).

In this issue, you'll also read about one of our outstanding alumni, Thomas Noyes, who has been featured for his expertise on national news programs, and after working for NASA and several other companies, is now CEO and founder of Commerce Signals (see p. 26). There are many other outstanding achievements of our tremendous faculty, alumni, and students featured throughout this issue.

Finally, please keep sending pictures and stories of your time at Big Orange—we love to share your memories with the entire MABE family! I look forward to hearing from you and invite you to get in touch and stay connected.

Best regards,

Matthew Mench

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Growing With Purpose

MABE Department on the Rise

Mechanical engineering classes were first offered at UT in 1877, laying the foundation for the department. Aerospace engineering came aboard in 1960 and became a full degree in its own right in 1968. In 1996, the department merged with engineering science and mechanics, bringing biomedical engineering into the fold for the first time. By 2014, all three levels of that degree were available.

Now, 141 years after its first classes and a decade after becoming "MABE," the department is undeniably on another growth spurt.

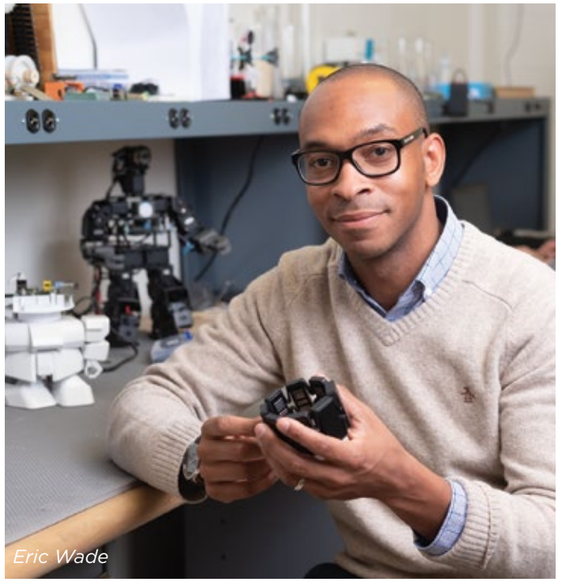
By the Numbers

In much the same way that the Tickle College of Engineering has been a key driver of UT's growth in recent years, the department has helped grow the college.

Since 2013, MABE's undergraduate enrollment has increased by almost 35 percent, from 941 to 1,267. During that same timeframe, the college as a whole has grown by roughly 25 percent—just shy of half of the college's total undergraduate growth can be directly traced to MABE.

Graduate Ranks Rising

On the graduate level, the numbers are even more impressive, with master's and doctoral student enrollment jumping almost 43 percent in the last five years, from 143 to 204. MABE represents about 18 percent of the college's total graduate students.



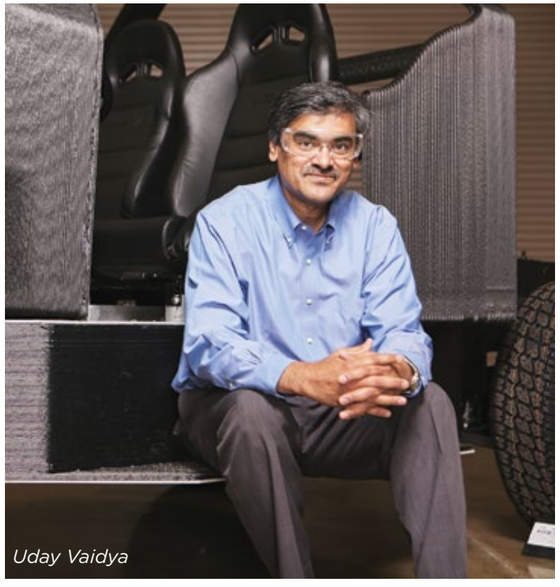
Eric Wade

Funding Research

MABE has seen phenomenal growth in its research output since 2013—nearly 60 percent, in fact. In 2017, research expenditures were nearly $12 million, bringing it on par with other higher ranked US programs.

Some of the more recent awards are impactful for the university's reputation as well as the department, including NASA picking assistant professor James Coder to lead a $10 million project, the largest single grant given to UT by the agency.

In the spring of 2018, UT-ORNL Governor's Chair for Advanced Manufacturing Suresh Babu was chosen to lead a $9.8 million Multidisciplinary University Research Initiative for the Office of Naval Research, the first time a UT professor has been selected in the program's history (read more, page 6).

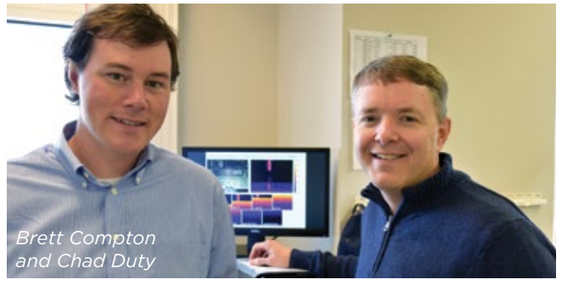


Uday Vaidya

Governor's Chairs

In addition to Babu, the department is home to UT-ORNL Governor's Chair for Advanced Composites Manufacturing Uday Vaidya, who is leading the $259 million Institute for Advanced Composites Manufacturing Innovation (IACMI).

The Governor's Chair program was created by former Governor Phil Bredesen as a way to bring in top talent from around the country to Oak Ridge National Laboratory and UT to inspire and lead efforts across several disciplines to address key global challenges.



Brett Compton and Chad Duty

EcoCar 3

NASA's Aviation Project

SynDaver Lab

Rosenberg Professor of Practice Matthew Young

H.H. Arnold Chair John Schmisseur

UTSI Hypersonics Lab

Strength in Faculty

The number of faculty lines in the department has steadily increased, with 20 positions added in the past six years and another three positions to be filled in the coming year.

The department is addressing issues as diverse as advanced manufacturing, robotics, energy, health, and flight through these hires, helping it tackle current issues while better positioning it for future research opportunities.

Endowed positions, including the Rosenberg Professor of Practice and the H.H. Arnold Chair, have also helped the department support faculty work.

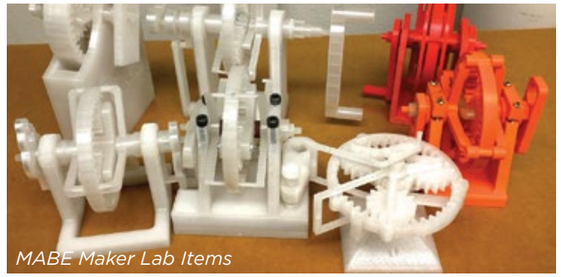
Unique Opportunities

While MABE has all the usual labs and equipment expected from its three disciplines, it also provides rare opportunities not always seen at other institutions.

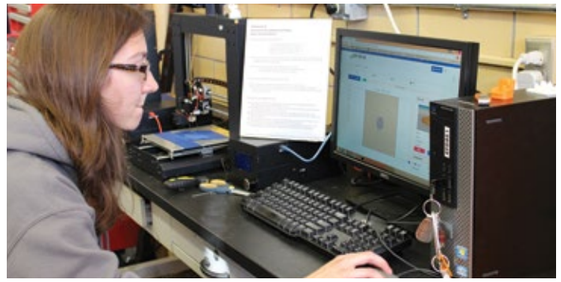
For the past nine years, mechanical engineering students have played a key role on UT's EcoCAR teams; one of only a small number of universities to take part in the DOE's Advanced Vehicle Technology Competition Series (read more, page 23).

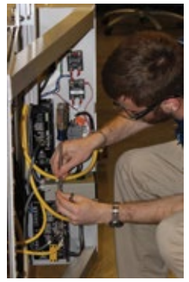
For biomedical engineering students, a synthetic cadaver named MABEline provides unmatched opportunities to study and practice on an incredibly lifelike body—the first device of its kind ever used by an engineering program in the US.

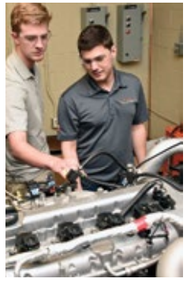
A new experience for graduate-level aerospace engineering students is the state-of-the-art hypersonics work being done at the UT Space Institute, including a massive, US Air Force-backed wind tunnel (read more, page 14).



MABE Maker Lab Items





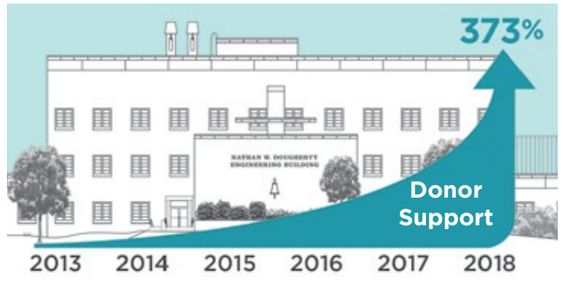


Student Enrichment

Recent efforts have helped deliver a more robust student experience outside of the classroom, as well.

MABE now has its own Maker Lab, an innovation space that houses industry-quality 3D printers (including a nylon printer), computer-aided design (CAD) stations, a waterjet cutter, and a computer numerical control (CNC) machine that can cut, lathe, grind, and mill in a five-axis setting. Together, these tools help bring to life student and faculty ideas from all three disciplines.

The department has also developed or refurbished spaces for senior design projects, group meetings, conferences, and study halls, and has added an advising center with two full-time advisors and a staff member.



Signs of Success

In 2018, all three departments made the U.S. News and World Report rankings, with aerospace engineering coming in at 27, mechanical engineering at 40, and biomedical at 49 (ranked for the first time) among public institutions.

Elements within the programs have also earned acclaim, with Value Colleges ranking the department's robotics, automation, and manufacturing concentration in the top 50 in the US.

Donor support is also stronger than ever, with contributions up 373 percent since 2013—not counting software donations or pending support.

Smooth Sailing

By David Goddard

While aircraft, missiles and satellites now play an important role for the US Navy, it still relies primarily on ships, as it has for 242 years.

Those vessels are only as good as the resources used to build them, however, so if a particular material has design flaws or is prone to failure, it can prove costly for lives and national security as well as create major financial implications.

UT has placed an emphasis on becoming a leader in advanced manufacturing and advanced materials in recent years, with seven UT-Oak Ridge National Laboratory Governor's Chair appointments focused on those areas.

Suresh Babu, UT-ORNL Governor's Chair for Advanced Manufacturing, recently received high validation for the work he has led, becoming the first from UT chosen to lead a Multidisciplinary University Research Initiative (MURI) in the 30-year history of the program.

"To be leading the first team from UT picked to handle a MURI project is quite an honor," said Babu.

His team will focus on properties, defects, and instabilities in advanced manufactured alloys, an area of great importance to the US Navy, who backed his selection.

"This selection highlights the expertise that we've assembled in advanced manufacturing and materials as well as the strength and importance of our Governor's Chair partnership with ORNL. The work Suresh and his team will do will directly impact national security," said Interim Chancellor Wayne Davis.

Much is still unknown about the physical and thermodynamic properties of certain materials, limiting our ability to describe them through models. Babu and his team hope to better explore a number of physical processes that can affect the final product, including rapid heating and cooling of materials, and examine how physical properties at small scales might differ from those at greater scales.

Babu began working on the project through UT's Office of Research and Engagement in 2017. His team includes Associate Professor Hahn Choo from the Department of Materials Science and Engineering as well as researchers from Virginia Tech, the Ohio State University, Iowa State University, the University of California-Santa Barbara, and the Colorado School of Mines.

An Australian team, led by Professor Simon Ringer at the University of Sydney, is also integrated into the project and includes colleagues from the University of New South Wales. The US universities will be sponsored by the Office of Naval Research, while the Australian team will be sponsored by the Australian Defence Science and Technology Organisation.

> "The work Suresh and his team will do will directly impact national security"
>
> *—Interim Chancellor Wayne Davis*

"This research will be crucial to all metal advanced manufacturing processes that use high energy deposition processes, all of which are relevant to US Department of Defense and manufacturing industries," said Babu.

While the award will total roughly $1.5 million a year for three years, extendable up to five years, the impact of Babu's research will last much longer and keep the Navy sailing smoothly for many more years to come.

Living in the Glass Age

By Whitney Heins

When Jackie Johnson started researching glass 25 years ago, she didn't realize she was on the so-called cutting edge.

"What we're doing is finally in fashion," laughed the professor of mechanical, aerospace, and biomedical engineering at the UT Space Institute.

That's because, according to some scientists, we are in the "Glass Age." Think of it; almost everything we use today has glass—from touchscreens on our smartphones to computers, buildings, automobiles, and thousands of other applications around the world.

What makes glass so prevalent is its versatility. It can be made in almost any shape or size. It has a wide range of useful properties—and therefore a wide range of applications.

> "Tennessee ranks number one in the country for automotive manufacturing strength"
>
> —Jackie Johnson

"With glass, you can add a component to it and get totally different properties," Johnson said. "But it isn't easy to do. Glass is an amorphous material with a short-range order so it's hard to pin down a definitive structure of the material."

The challenge is what's attracted Johnson to glass. She loves that it makes her think and holds promise for Johnson to make a big impact in people's lives.

Among many areas, Johnson is studying glass to improve medical imaging. By mixing certain compounds she can produce a glass-ceramic image plate. Unlike other imaging materials, glass is transparent. It doesn't scatter light, which keeps images sharp.

Sharper images mean earlier detection of diseases like cancer. It can also mean less costly health care.

"In a large hospital setting, with digital radiography technology, many expensive detector systems are needed for x-ray readout. With our technology, based on computed radiography (CR), the images are projected onto the glass plates, which store the images. Then you only need one central system to read the image plates," Johnson explained.

Similar CR technology is used in many parts of the world, including the US, but the images aren't as sharp as Johnson's work, which won an R&D100 award in 2007.

Other projects Johnson is involved with include the development of sodium ion batteries, diamond-like carbon films for biomedical applications, and treatment for cancerous tumors using magnetic fields.

Despite being in a so-called Glass Age, the number of rising glass scientists is low. This is something Johnson is trying to change. She started an internship program at UTSI where several students ended up becoming graduate students at the institute, working on glass-related projects.

She also has funding from the Ceramic and Glass Industry Foundation to put on a twice-yearly lecture series hosted by her graduate students to educate local high school students on the merits of working in glass and ceramics.

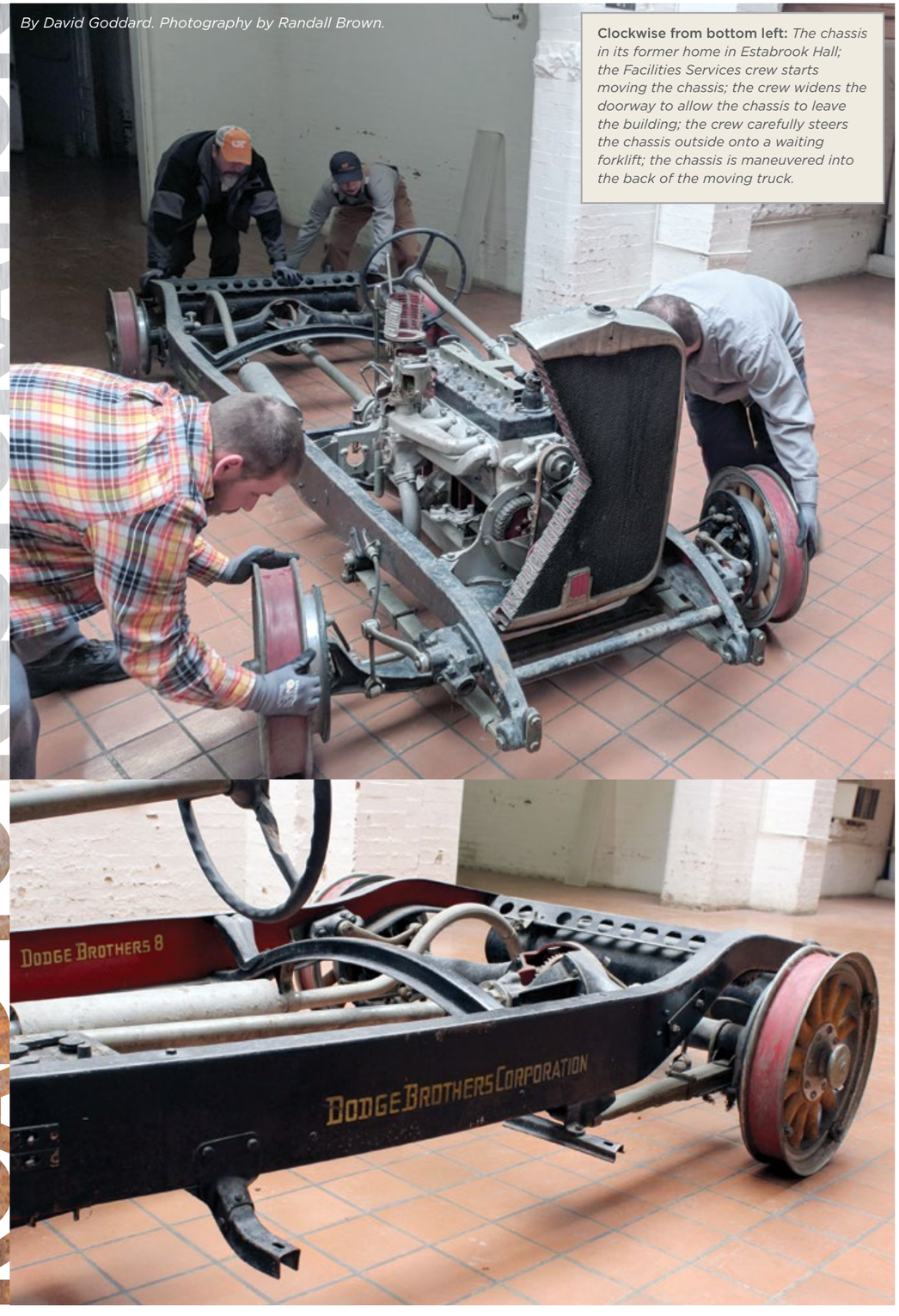
"There are a surprisingly large number of glass industries in Tennessee across several disciplines such as automobile manufacturing. In fact, Tennessee ranks number one in the country for automotive manufacturing strength," Johnson shared.

There are operations for Nissan, General Motors, and Volkswagen to name a few, as well as multiple window glass companies and bottling companies, such as Coca Cola, and a large battery complex for Nissan.

"The region is primed for glass development and manufacturing so there is a need to educate our youth on the potential for great research careers," explained Johnson, who is keen for others to be in fashion, too.

ROAD TO RESTORATION

By David Goddard. Photography by Randall Brown.



Clockwise from bottom left: *The chassis in its former home in Estabrook Hall; the Facilities Services crew starts moving the chassis; the crew widens the doorway to allow the chassis to leave the building; the crew carefully steers the chassis outside onto a waiting forklift; the chassis is maneuvered into the back of the moving truck.*

Historic 1920s Dodge from Estabrook Getting a Makeover

Over the course of its history, Estabrook Hall played host to a number of programs, from mechanic arts to architecture, from civil engineering to computer laboratories.

One of the constants for most of that time was a chassis of a 1920s Dodge Brothers automobile, long since stripped down for use as a model of engineering.

In much the same way that elements of Estabrook will survive to be incorporated into the new building, the Dodge has also found an extended life.

The Gilmore Car Museum of Hickory Corners, Michigan, found out about the car and has taken it to be restored to its former glory.

“A lot of our engineering alumni and alumni across UT are familiar with the car,” said Interim Chancellor Wayne Davis, who took classes at Estabrook as a PhD student in the early 1970s.

“Having it restored, and having them do it through a learning project, is a fitting result,” Davis said.

MABE Professor Emeritus Mancil Milligan remembers seeing the chassis for the first time in 1955 when he entered Estabrook as a mechanical engineering student.

“With the mechanical engineering department being housed in Estabrook until the early 1960s, I can assure that many if not most of the ME students of the 50s spent significant time examining the chassis as it related to many subjects being studied in courses such as machine design and internal combustion engines,” Milligan said.

Gilmore’s plan is to have high school students from their Gilmore Garage Works restore the car as part of their work-study program.

Founded in 2009, Gilmore Garage Works is an after-school program that pairs students with mentors, helping them learn all about automotive technology, repair, and restoration.

The goal is to prepare students for careers in the automotive industry, while at the same time educating them about automotive history through the classic vehicles they restore.

The museum and program both highlight what is often considered the golden age of automobiles, from the 1930s through the 1960s.

The exact year of the chassis from Estabrook isn’t known, but Davis pointed out that Dodge Brothers was sold to Chrysler in 1928 and became simply known as Dodge, so the model was from 1927 at the latest.

A team from Gilmore came to UT in mid-January to take possession of the car, with Facilities Services helping carefully remove it from the building and roll it into the museum’s trailer.

While there is major work to be done to completely restore the car, it still has a lot of its original parts, including steel rims, wooden spokes, platforms for running boards, and a still-functioning axle and wheels.

Watch the chassis being removed from Estabrook at **tiny.utk.edu/chassis**.

MABE Honors Top Students and Faculty

Hall of Fame Inductee Bennett Croswell receives his plaque from Department Head Matthew Mench during the banquet.

Hall of Fame inductee Katherine Van Hooser receives her plaque from Department Head Matthew Mench during the banquet.

Pete DeBusk speaks about his career during the banquet.

Over 150 students, faculty, alumni, and distinguished guests filled the Foundry on April 12 to honor MABE's top students, faculty, and newest Hall of Fame members at the MABE Awards Banquet this spring. Guest speaker **Pete DeBusk**, chairman and founder of DeRoyal Industries, shared the history of his successful career and encouraged the crowd to always look at the glass as half full and make the most of the life you have.

Bennett Croswell and **Katherine Van Hooser** were officially inducted in the department's Hall of Fame, increasing the hall's membership to eleven.

The student and faculty award winners included:

Lia Winter
MABE Translational Research and Innovation Award

Julie King
MABE Student Leadership Award

Camille Bergin
Outstanding Junior in Aerospace Engineering Award

Simran Dayal
Outstanding Junior in Biomedical Engineering Award

Carter Breeding, **William Davis**, and **Michael Buckley**
Outstanding Junior in Mechanical Engineering Award

Jacob McCoy
Outstanding Senior in Aerospace Engineering Award

Kaleb King
Outstanding Senior in Biomedical Engineering Award

Leyton Adams and **Nathaniel Brandt**
Outstanding Senior in Mechanical Engineering Award

Denzel Bridges, **Zhenye Kang**, and **Seyyed Ali Davari**
Outstanding Graduate Student Award

Assistant Professor **Caleb Rucker**
Thomas Stewart McCorkle Family Endowed Faculty Award

Assistant Professor **Andy Sarles**
Louis and Ann Hoffman Endowed Excellence in Research Award

Professor **Uday Vaidya**
B. Ray Thompson Endowed Excellence in Research Award

Associate Professor **Chad Duty**
MABE Outstanding Faculty Initiative and Leadership Award and Pi Tau Sigma Excellence in Teaching Award

MABE Department Head **Matthew Mench** surprised Associate Professor **Toby Boulet** with the Department Head's Endowed Outstanding Faculty Service award and announced the award will be renamed the J.A.M. Boulet Outstanding Faculty (or Staff) Service Award in honor of Boulet who retired in July.

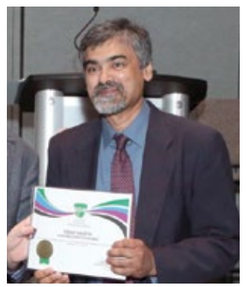
Faculty Notes


UTSI Professor Emeritus **Gary Flandro** received the 2018 Distinguished Alumni award from the California Institute of Technology. The award is the highest honor the institute bestows upon a graduate and is given in recognition of a particular achievement of significant value or a career of noteworthy accomplishment.

Flandro's work has supported decades of solar exploration missions, in particular, his design and engineering of multi-outer-planet missions, including NASA's Grand Tour. In 1964, he discovered that a rare alignment—occurring once every 175 years—of Jupiter, Saturn, Uranus, and Neptune would take place in the 1970s. He conceived a multi-planet mission harnessing the gravity-assist technique to reduce mission duration. Elements of his plan were incorporated in to the Voyager program, which sent two probes to the outer Solar System.

Flandro received his master's ('60) and PhD ('67) in aeronautics from Caltech and worked at NASA's Jet Propulsion Laboratory while he was a student. He joined UTSI in 1991 as the Boling Chair of Excellence, a position he held until retiring in 2009.

In May, the Society of Plastics Engineers (SPE) recognized UT-ORNL Governor's Chair **Uday Vaidya** as an Honored Service Member for his contributions to the society at ANTEC 2018, the world's largest plastics technical conference. The honor is given to members who have demonstrated long-term outstanding service to, and support of, the society and its objectives. Only 327 members have received this honor since it was established in 1992.


Uday Vaidya is presented his Honored Service Member Award at ANTEC.


Assistant Professor **Andy Sarles** received a 2018 National Science Foundation (NSF) Early CAREER award for his proposal "Revealing the fundamental interactions of cell-penetrating nanoparticles in a complex model membrane." The award is the most prestigious award given by NSF to junior faculty who are making an impact in their field. Sarles, who is the seventh MABE recipient of the award, will receive a five-year grant to help advance his research efforts to develop new experimental approaches to more effectively measure the interactions between nanomaterials and cellular membranes. Sarles hopes to explain how a type of amphiphilic—meaning it both repels and attracts water—nanoparticle can enter cells without causing damage. This knowledge will help unlock the necessary details for designing nanoparticles as vehicles to transport chemical species into cells and tissues, paving the way for advanced medicinal, chemical, and agricultural uses. Sarles is director of the Bioinspired Materials and Transduction Laboratory and developed INTERFACE, an outreach program that will include UT undergraduate researchers and journalism students as well as high-school students from L&N STEM Academy in Knoxville.


Jessie Rogers Zeanah Faculty Fellow **Stephanie TerMaath** and her students have partnered with the Naval Surface Warfare Center, Carderock Division on a three-year project to study the material side of additive manufacturing (AM). The objective is to better understand how to qualify fiber-reinforced AM materials for use in shipboard applications. The team is using experimental and computational methods to test custom filaments for the 3D printing process in order to quantify uncertainty in mechanical properties of AM parts due to process controls. Now in the project's second year, the team is investigating crack growth with the goal of developing multi-scale computational models that capture the effects of the microstructure on the macroscale performance. Several students from this project are now working as engineers at Navy facilities, and the Navy plans to recruit additional students in the future. Read the full story at **tiny/utk.edu/navy**.

Foster Retires


Steve Foster retired from MABE on May 31 after eight years of service. As a lecturer, Foster guided hundreds of students through the senior design process. This past year, his senior design teams worked on projects for LexMark, 3D Systems, and the UT Football and Swimming and Diving teams. His knowledge and leadership will be missed.

Promotion and Tenure

Reza Abedi has been promoted to associate professor with tenure. Abedi joined MABE as an assistant professor in 2012 and is located at UTSI. His research interests are in general areas of applied mathematics, computational mechanics, computational electromagnetics, and fracture modeling.

Subhadeep Chakraborty has been promoted to associate professor with tenure. Chakraborty joined MABE in 2010 as a post-doctoral research associate in the Electrochemical Energy Storage and Conversion Laboratory. He was hired as an assistant professor in 2012. Chakraborty is the director of the Complex Systems Monitoring and Stability Laboratory. His research areas include social-cultural opinion dynamics, connected vehicles, egress and evacuation, and inverse reinforcement learning.

Jacqueline Johnson has been promoted to full professor. Johnson joined UTSI as an associate professor in 2007. Johnson's research started in the area of magnetism and transitioned to the study of glass and other amorphous materials using neutron scattering. She continues to synthesize and characterize glasses, glass ceramics, and nanomaterials pertaining to medical devices, non-destructive evaluation, and image enhancement. Her research in magnetism has come full circle in that she is now developing magnetic nanoparticles for theranostics (read more about Johnson, page 7).

Feng-Yuan Zhang has been granted tenure. Zhang was hired as an associate professor in MABE in 2012. He is located at UTSI and is director of the Nanodynamics and High-Efficiency Lab for Propulsion and Power. His research interests include development of high-efficiency, low-cost, and sustainable materials, sensors, and devices with nanotechnology and advanced manufacturing, including fuel cells, electrolyzers, batteries, direct combustion engines, and electric thrusters.

New Faculty

Amartya Banerjee joined the department this fall as an assistant professor of mechanical engineering. Before joining MABE, Banerjee was a postdoctoral fellow in the computational research division at Lawrence Berkeley National Laboratory. His research interests include the development and usage of mathematical and computational tools for the characterization and informed discovery of novel nano-materials and nano-structures.

Phil Kreth was hired as an assistant professor of aerospace engineering last February after working as a research assistant professor in the department since 2016. Kreth is located at UTSI where he is supporting hypersonics research. He plans to develop an optical diagnostics and flow control laboratory. Kreth played a critical role in developing the Mach 4 wind tunnel and establishing the Tennessee Aerothermodynamics Laboratory at UTSI. The tunnel was first operated in the spring and is one of the largest supersonic tunnels in academia.

Zhenbo Wang joined the department this fall as an assistant professor of aerospace engineering. Wang received his PhD from Purdue University in May. His research interests are in the area of guidance, control, and flight dynamic, and specifically include optimal control theory and convex optimization with applications in computational control, advanced guidance of space transportation systems, and autonomous trajectory optimization of spacecraft systems and air vehicles.

Boulet retires after 33 years at UT

On July 31, **Toby Boulet** officially retired from the university after 33 years of loyal and dedicated service. The department celebrated his career with a party, held May 18 at the UT Visitor's Center.

Boulet began his career at UT in 1985 as an assistant professor in the Department of Engineering Science and Mechanics, which became part of MABE in 1995. Over the years, Boulet taught several classes, including dynamics, vibrations, structural mechanics, system dynamics, and continuum mechanics. He is well-known across campus, having served as a member and president of the UT and Tennessee University Faculty Senates, was a member of the UT Board of Trustees, and served on the UT Diversity and UT Top 25 Advisory Councils. At retirement, Boulet was an associate professor and associate head of undergraduate programs for MABE.

Boulet was presented with an award for his 33 years of service to the university.

Boulet enjoyed his retirement party with...

Professor and Associate Dean of Academic and Student Affairs Masood Parang

Associate Professor Madhu Madhukar, and Professor Majid Keyhani

Associate Department Head and Graduate Program Director Kivanc Ekici

Assistant Professor Caleb Rucker and Rosenberg Professor of Practice Matthew Young

MABE Department Head Matthew Mench

Professor Bill Hamel

Professor Emeritus Rao Arimilli

Assistant Professors Seungha Shin and Anming Hu

Faculty and Staff Honored at TCE Awards Dinner

Four members of MABE's faculty and staff received awards at the Tickle College of Engineering Awards Banquet, held April 5 at the Knoxville Museum of Art. Award winners were:

Assistant Professor **Eric Wade**: TCE 2018 Teaching Fellow Award

Assistant Professor **James Coder**: Dean's Junior Faculty Research Excellence Award

Assistant Professor **Andy Sarles**: TCE Professional Promise in Research Award

Communications Specialist **Kathy Williams**: Outstanding Support Staff Award

L-R: Assistant Professor James Coder, Communications Specialist Kathy Williams, and Assistant Professor Andy Sarles show off the awards they received at the TCE Awards Banquet.

Assistant Professors Andy Sarles and Eric Wade at the TCE Awards Banquet.

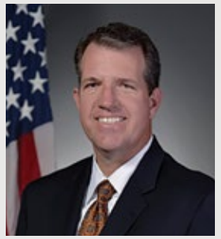
Revolutionizing Hypersonics

By David Goddard. Photography by Sam Thomas.

It's a bird! It's a plane! It's a plane traveling at hypersonic speed!

Anyone familiar with the fictional exploits of Superman knows that part of his super powers is that he is "faster than a speeding bullet."

Thanks to research being done in part by UT's John Schmisseur, it will soon be possible to produce aircraft that make even the Man of Steel seem slow.



Schmisseur, the H. H. Arnold Chair in Computational Fluid Dynamics and B. H. Goethert Professor at the UT Space Institute (UTSI), is part of a team exploring the production of materials and structures for use in hypersonic aircraft travelling at more than five times the speed of sound.

At sea level, that means a speed of 3,800 miles per hour, meaning an aircraft could fly from Knoxville to Tokyo in less than two hours.

There's just one problem.

"The heat generated by vehicles travelling that fast goes well beyond our current capabilities," said Schmisseur. "We have to gain a better understanding of how and where that heat is most likely to build, the loads and pressures it exerts, and identify the most critical regions of the aircraft.

"The institutions in UT's system have the competencies to help solve those riddles."

What is UTSI's main role in the project?

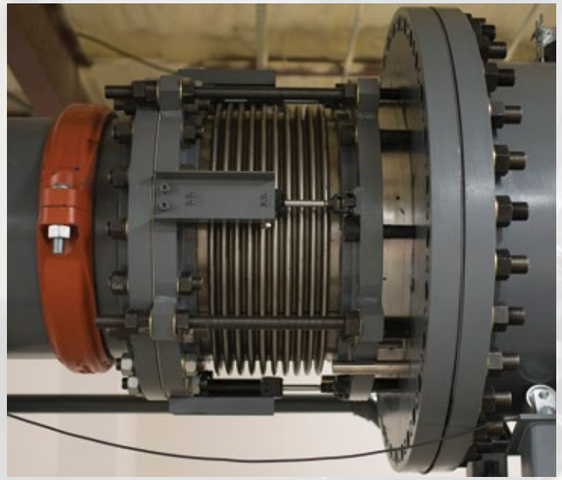
Schmisseur and others at UT are working on the aerodynamic loads generated by the hypersonic flow—the extreme heat and pressure loads generated on the surface due to flight.

The team will then turn over that data to Dayton, who will use it to help design the structure and material design, meaning the results UT collects will be vital to the success of the project.

Schmisseur has named his program the High-Speed Original Research and Innovation Zone, or HORIZON.

"Our three campuses have a lot of intellectual firepower to bring to bear on this," said Schmisseur. "The Tennessee Department of Economic and Community Development feels that aerospace and defense are keys in the state's economy. UT system-wide partnerships to enhance research and innovation in support of those efforts will be bolstered by this project."

Within the next year, Schmisseur's hope is that UTSI's experiments will travel 15 minutes down the road to the Arnold Engineering Development Complex (AEDC), which he calls the crown jewel and epicenter of Air Force hypersonics research in the US.



Team Composition

The $9.8 million project, funded through the US Air Force Research Laboratory, includes Schmisseur and his colleagues at Purdue University and the University of Dayton Research Institute.

Schmisseur will be UT's system-wide leader of the project, which will be performing both simulations and experiments to guide designs being done at Dayton. The UT team consists of 15 faculty researchers from UTSI, UT Knoxville, and UT Chattanooga.

US Senator Lamar Alexandar and US Representatives Scott DesJarlais and Chuck Fleischmann were key players in moving the project forward.

Project Goal

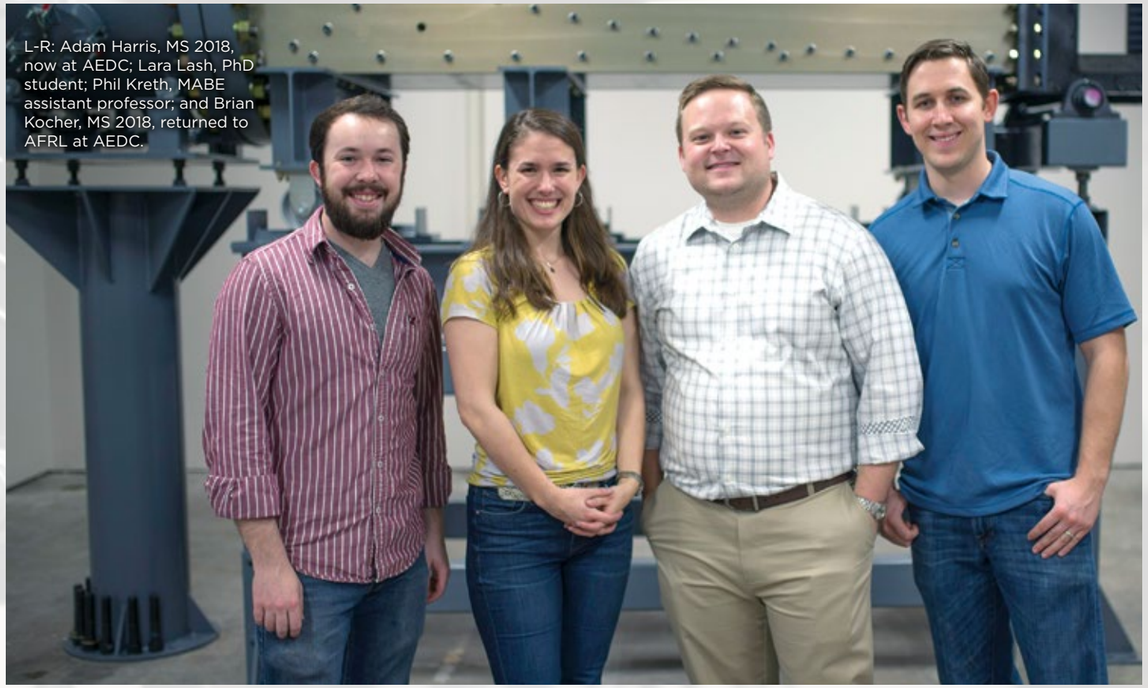
The team is charged with developing new materials for use in its craft that can overcome the issues created by heat at hypersonic speed.

Just how big is one of academia's largest wind tunnels?

While the diameter of most supersonic wind tunnels can be measured in inches, UTSI's will be two feet wide, 156 feet long, and housed in a nondescript metal building on campus.

During operation, a powerful vacuum is created in a large tank outside the building. The tank connects to a 105-foot tube that passes through an exterior wall, creating air flow in the wind tunnel.

The vacuum tank



L-R: Adam Harris, MS 2018, now at AEDC; Lara Lash, PhD student; Phil Kreth, MABE assistant professor; and Brian Kocher, MS 2018, returned to AFRL at AEDC.

AEDC operates more than 55 aerodynamic and propulsion wind tunnels, rocket and turbine engine test cells, ballistic ranges, sled tracks, centrifuges, and other specialized units, but testing takes hundreds of thousands of dollars per week, if not millions per test, according to Schmisseur.

To get around that problem, he and his team have developed a massive, state-of-the-art wind tunnel facility known as the Tennessee Aerothermodynamics Laboratory, or TALon.

Schmisseur said that TALon creates "a natural pathway to a discovery, innovation, technology development and early research environment," and that it easily helps support the mission of AEDC. It will also offer relatively low-cost experimentation at tens of dollars per test.

"We want to use hypersonic research to drive new accomplishments and growth from an industrial and economic standpoint here at home," said Schmisseur. "Understanding how test data ultimately translates into the acquisition process will benefit manufacturing."

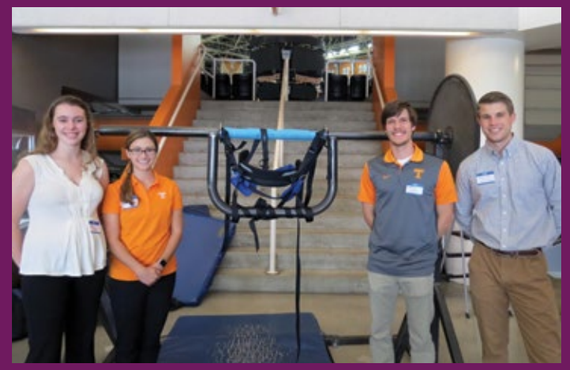
Aerospace and defense sectors are already the fourth-largest economic areas for Tennessee. Improvements to those fields at UTSI could greatly benefit the state, helping its economy soar for decades to come.

Senior Design Showcase 2018

On April 26, Thompson-Boling Arena was filled with excitement as 44 teams of students showed off their senior design projects at MABE's third annual Senior Design Showcase. The teams spent the afternoon talking to guests and demonstrating how their projects worked. Awards were given to the three best posters, three best mechanical engineering projects, and best biomedical and aerospace engineering projects.

Lee Fullam, Lindsay Little, MaryBeth Iannuzzi, and Julia Meyer show off the automated practice target they made for the UT Football team. The team created the moving target so the quarterback could practice his passes for various routines.

Adam Cable, Kaleb King, Will Clayton, and Shelby Goodsell pose with MABE's Syndaver to demonstrate how their attachable gurney support system helps immobile patients move.



Taylor Briggs, Mia Becker, Samuel Cook, and Sam Scruggs show off the dive simulation machine they created for the UT Swimming and Diving team to help them practice positions.

David Marsh, Heather Young, Patrick Jung, and Andrew Reis created a dual-wire robotic MIG smart-tool system for a robotic welding arm for ORNL s Manufacturing Demonstration Facility (MDF).

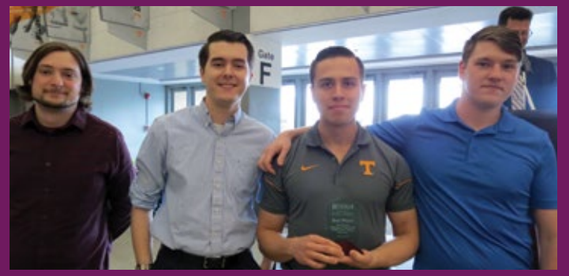
A member of the UT Swimming and Diving team tests the dive simulation machine during the showcase.

Tori Idem, Jonathan Wells, Joseph Schnidler, and Clayton Maner displayed their Powder Metering System for Laser Sintering.

The AIAA Design-Build-Fly Competition Team won Best Aerospace Engineering Project.

Biomedical Team 1 won Best Biomedical Engineering Project for their cardiac catheterization simulation device.

The KARM Team came in third for Best Mechanical Engineering Project for the Side Load Gaylord Dumper they created for KARM.



Greenleaf Industries Team 2 took home second for Best Mechanical Engineering Project for their automated AC knob assembly project.

Muse Team 1 came in first for Best Mechanical Engineering Project and Best Poster for their interactive water table museum exhibit.

The ORNL MDF Team came in third for Best Poster for their dual-wire robotic MIG smart-tool system.

MECO Team 1 came in second for Best Poster for their charcoal chimney for Aussie Walk A-Bout grill.

Dean's List Spring 2018

Summa Cum Laude

Aerospace Engineering

Teague A. Aarant
Lance R. Adams
Hayden P. Allen
Emily A. Beckman
Camille E. Bergin
Christopher J. Busic
Jared A. Carnes
Ethan M. Cerrito
Zane Chapman
Brian G. Coulter
Zackery C. Crum
Sean M. Darling
Jonathan A. Dixon
Daniel E. Epperson
Kenta P. Funada
Samantha N. Golter
Timothy L. Grizzel
Seth R. Holladay
Cooper C. Jenkins
Peyton B. Jenkins
Gavin W. Jones
Ryan E. Kelly
William J. Kobler
Mikhail M. Lamay
Jacob A. McCoy
Spencer T. McDonald
Gillian S. McGlothin
Matthew F. McVey
Willie N. Parker
Steven D. Patrick
Nicholas A. Patterson
Caleb H. Peck
Chapel R. Rice
Colter W. Russell
Maxwell A. Samlow
Charles D. Wallen
Samuel B. Walters
Caleb E. Weatherly
Stewart R. Whaley
Andrew T. Wilcox
William D. Wisdom
Jeongmin A. You

Biomedical Engineering

Taylor A. Berger
Samantha Z. Bratcher
Kailee J. Buttice
Tristan A. Davenport
Simran Dayal
John T. Deinhart
Gehrig Q. Elkins
Sarah Enani
Madeleine M. Fitts
Christopher R. Forsyth
Kellen J. Glasscock
Shelby M. Goodsell
Anneka J. Granvold
Carson D. Helton
Trenton J. Hinson
Elizabeth A. Jelinek
Lauren T. Jennings
Jenna M. LaColla
Alicia A. Matavosian
Delaina K. McDonald
Miroslava I. Migovich
Courtney C. Mobbs
Bradley S. Moore
Alexandra E. Natale
Hannah N. Olsen
Megan E. Pitz
Sophia H. Pouya
Debra R. Sagmiller
Francisco J. Sanchez
Jillian M. Schwendeman
Micah A. Shirran
Connor Sims
Rachel L. Slappy
Carli M. Stewart
Katherine E. Stiles
Mitchell T. Stockinger
Taggart C. Stork
Joseph Tawfik
Katherine C. Wallace
Gavin L. Warrington
Sarah E. Wilson
Hunter M. Woodall
izhi Xia
Anna L. Young

Mechanical Engineering

Leyton A. Adams
Alix J. Ambrose
Kyle S. Andersen
Alexander W. Arbogast
Chad F. Arnold
Keith S. Arnwine
Aaron M. Beaubien
Nathan T. Bingham
Benjamin L. Blackburn
James D. Blanks
Bradley M. Bloedorn
Jose L. Bonilla
William A. Botts
Leegan M. Boudreau
Mallory N. Bowers
Conner H. Bradshaw
Nathaniel C. Brandt
Cole A. Brill
Austin M. Bryan
Jesse R. Buckley
Michael J. Buckley
Andre C. Bucks
Laura M. Burke
Michael W. Burnside
Jesse Butler
Rory M. Butler
William C. Buttrey
Austin R. Cain
Joseph A. Camacho
Courtney T. Cartwright
Dakota Cauthen
Danielle A. Ceccarelli
Riley A. Chambers
Wilton M. Chapman
Joseph B. Chong
Eric Clark
Nicholas R. Collins
Connor J. Cooke
Gregory M. Corson
Adam T. Daniel
Tanner C. Davis
William P. Davis
Alexandra N. Defilippis
Edward Deiderich
Christopher A. Dias
Emma A. Drum
Ryan J. Dunaway
Ryan J. Durkee
Mikayla M. Ehrsam
Gregory L. Elder
Riley A. Farnsworth
Cody A. Ferguson
Elizabeth S. Fowler
Aaron M. Gerhard
Grant M. Given
Conner W. Godbold
Danielle N. Goodloe
Clark A. Hall
Shannon M. Hall
Tucker D. Hall
Rebekah F. Henderson
Jeremy L. Hensley
Jonathon E. Hicks
Sarah R. Higginbotham
Andrew J. Homan
Dalton I. Houser
Luke M. Howard
Luke W. Hudgin
William A. Hunter
Mary E. Iannuzzi
Victoria E. Idem
Bethany D. Jones
Taylor W. Jordan
Dylan R. Junion
Christopher R. Kelly
Jinwoo Kim
Kelsey N. Klett
Tarun K. Kukreja
Mariah R. Lafond
Rebecca R. Laughon
Isaiah G. Linkous
Benjamin R. Luffman
David M. Marsh
Austin C. Maryanski
Michael S. McClanahan
Landen G. McDonald
Zebulon G. McReynolds
Iris N. Melara Guzman
Kirillos Mikhaiel
Graham Y. Montgomery
Joshua N. Morcos
Jacob N. Nagy
Seth A. Newport
Tyler J. Newsom
Zachary C. Nicely
Grayson T. Northern
Logan C. Parham
Seth T. Parker
Donald J. Partin
James M. Pearce
Abigail C. Pennington
Matthew T. Puleo
Holly J. Robbins
Kiel T. Russell
Sebastian Sanchez
Joseph A. Schindler
Jared S. Shaffer
Shannon R. Sharp
Ariel C. Shower
Jeremy A. Siler
Rebecca C. Sphar
John P. Spires
Kera M. Stoops
Dillon M. Sutherland
Benjamin S. Terry
Benjamin F. Thieme
William R. Thompson
John F. Thress
Parker E. Trulove
Ethan C. Vals
Eric J. Vercellone
James Walsh
John A. Ward
Jonathan R. Wells
Tanner O. White
Justin T. Wilcox
Jesse M. Wilson
Shane C. Wood
Jasmine R. Worlds
Gennick J. Yoshioka
Trenton B. Yount
William N. Zabo
Jonah F. Zahn

Magna Cum Laude

Aerospace Engineering

Emma K. Farrar
William A. Huffman
Nicholas D. Kearse
Ethan Long
Caleb M. Morgan
Sang Hyeok Park
Daniel A. Rudolph
Matthew R. Trainer
Christopher W. Violet

Biomedical Engineering

Sara B. Aboeleneen
Robert L. Borkoski
Amanda M. Dreisbach
Emily C. Gable
Samuel F. Gallemore
Cameron A. Goodman
Nathaniel L. Hauser
Mackenzie K. Hooker
Emma D. Johnson
Branndon P. Jones
Joshua S. Key
Shannone Paik
Amanda N. Randolph
Tyler A. Reynolds
Christian A. Waksmunski

Mechanical Engineering

Jacob B. Aljundi
Matthew B. Alley
Shems Eddine Belhout
James D. Bowman
Daniel E. Brimer
Erin Brown
Joshua S. Campbell
Christopher J. Cannon
Keenan Cox
David H. Crafton
Corey R. Crawford
Malik A. Crutchfield
Austin M. Davis
Andrew N. Elder
Lawrence M. Elkin
Patrick N. Ellis
Lee R. Fullam
Vincent C. Gambuzza
Ryan J. Glenn
Gregory M. Gorman
Grayson D. Gregory
Austin R. Grimes
Jackson T. Hardeman
Nicholas K. Hassler
Leah S. Hawkins
Lee W. Howell
Zaky G. Hussein
Noah Johnson
Nicholas E. Keen
Michael B. Keesee
David N. Krispin
Katelyn J. Luthi
Jared A. Magee
Jacob T. Maine
Michelle E. McNamara
Sean P. Meier
Truman B. Melton
Ryan W. Mohr
Lauren D. Morelock
Waleed Z. Nofal
Zachary B. Nolan
William B. Norris
Nathan R. Oliver
Stephanie K. Paradissis
Matthew D. Perlov
John A. Perryman
Joshua R. Reed
Ryan C. Savery
Derek H. Siddel
Terry L. Stewart
Carter J. Sutton
Daniel G. VanFleteren
Erica L. Waters
Ethan T. Weaver
Jackson K. Wilt
Joseph Wing
Eric S. Wise
Samuel M. Wright
Heather Young
Connor J. Zabo

Cum Laude

Aerospace Engineering

Benjamin C. Barnhill
Lucas B. Berryman
Matthew E. Bolyard
Ryan Cannon S. Buechley
Coleman R. Davis
Andrew J. Duncan
Grayson T. Foster
Mattheus E. Fry
Andrew E. Healan
Joshua A. Mohammed
Raj V. Patel
Soham Paul
Jared E. Pyron
Angus Shaw

Biomedical Engineering

Jami E. Anderson
Chance M. Cuthbert
Grace N. Forbes
Bailey M. Giacomini
Luke J. Hamby
Anna Clare Herline
Stone E. Isaacs
Justin R. Kilmarx
Becka Lynn A. Klein
Nicole J. Kowalski
William H. Kuebitz
Richard K. Kuehn
Matthew R. Kushnir
Mitchell J. Langley
Natalie V. Ledezma
John C. Mcdearman
Nathaniel B. Reinoehl
Matthew M. Rowe
Elijah D. Smith
Carmelo V. Venero
Marina I. Vlasyuk

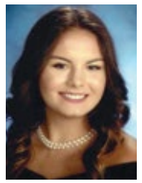
Mechanical Engineering

Ifedayo A. Akinduro
Mohanad T. Alhams
Nicholas A. Bales
Jacqueline O. Berger
William T. Bright
Timothy A. Campbell
Kevin R. Carini
Austin S. Chapel
Davis C. Cole
Andrew B. Cordray
Tyler M. Corum
McGavock L. Crawford
Frank Dam
William B. Darlington
Evan W. Day
Brandon J. Glover
Jacob N. Groothuis
Felipe Gutierrez
Mitchel T. Haendel
Brandon D. Haggerty
Joshua R. Ham
Daniel S. Howard
Ashley A. John
Patrick V. Jung
Rebecca A. Link
Jacob Melton
Brooke L. Narducci
Heather M. Nevills
Patrick Parker
Charles G. Parsons
Nisarg B. Patel
Jamie M. Peterson
Andrew S. Pitsenberger
Lizabeth J. Quigley
Abigail E. Roberts
Samuel J. Scruggs
David J. Smith
Maximilian Smith
Patrick B. Stephens
Yancey A. Stewart
Alexander B. Stidham
William C. Tourville
Dylan C. Townson
Canh D. Tran
John W. Valentine
Dylan M. Webb
Christopher E. Willenberg
Bryan L. Wixson

Student Notes

Camille Bergin (AE, senior) received the $5,000 Wernher von Braun Scholarship from the AIAA Foundation. This scholarship, named in honor of a German rocketeer and founder of the US Space program, is awarded each year to an outstanding AIAA student member. Over the summer, Bergin interned on the Orion program at Lockheed Martin Space Systems, where she plans to continue working as a systems engineer upon graduation. Bergin hopes to use her AE degree to further human space exploration, specifically getting people to Mars in the fastest, most efficient way possible.

Megan Pitz (BME, senior) won first place in the research poster competition at UT's annual Exhibition of Undergraduate Research and Creative Achievement (EURēCA) event in April. The event showcases the research and creative activities of current undergraduate students. Pitz works as an undergraduate research assistant in the Bioinspired Materials and Transduction Laboratory under the direction of Assistant Professor Andy Sarles.



Kinley Koontz, who plans to major in biomedical engineering, is one of fifteen incoming UT freshmen admitted to the prestigious Haslam Scholars program. Koontz receives an endowed scholarship to cover tuition and housing along with funding to support independent research. She will enjoy an exclusive curriculum, interdisciplinary seminars, and community service-learning. She will also participate in a collaborative study abroad experience in Edinburgh, Scotland.

Koontz is a graduate of West High School in Knoxville and hopes to one day go to medical school. She is an award-winning community volunteer. While in high school she organized partnerships between her school and civic organizations, including UT's Community Schools program at Pond Gap Elementary. She founded the Garden Project, a nonprofit organization that promotes positive growth for at-risk youth through artistic expression, and has developed a program that could allow the organization to spread nationwide.

This fall, aerospace engineering students **Coleman Davis** (junior) and **Christopher Violet** (senior) became the first-ever UT students to receive scholarships through the US Department of Defense (DoD) Science, Mathematics & Research for Transformation (SMART) Scholarship-for-Service program. The program, which aims to increase civilian scientists and engineers at DoD facilities, provides students pursuing a technical degree in a STEM discipline a full scholarship and a job with DoD upon graduation.

Davis is sponsored by the Space and Missile Systems Center, a subordinate unit of the Air Force Space Command, in Los Angeles. The center is responsible for on-orbit check-out, testing, sustainment, and maintenance of military satellite constellations and other DoD space systems.

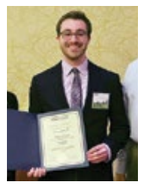
Violet will stay at UT an extra year to obtain his master's. He is sponsored by the Fleet Readiness Center in Cherry Point, North Carolina. The center focuses on the maintainability and sustainability of Vertical/Short Take-Off and Landing Aircraft.

Team Extracts Water at Mars Ice Challenge, Finishes Fourth

Team members (front) Aaron Crigger, (L–R) Kurtis Kuipers, Skylar Jordan, Matthew DeMorat, and Trenton Bullman.

A team of students from UT had success with their improved digging system at this year's NASA RASC-AL Mars Ice Challenge. The system was able to extract water from the simulated Martian subsurface ice, resulting in a fourth-place finish for the team. Five students, along with their faculty advisor MABE Assistant Professor **James Coder**, traveled to Langley Research Center in June for the challenge.

UTSI Students Win at AIAA Student Conference



Two UTSI graduate students won awards in the Master's Technical Paper Competition at the 69th Annual AIAA Southeastern Regional Student Conference held in Mobile, Alabama, in April. **Matthew Schwartz** (AE) won first place with his paper, "Characterization of near-muzzle ballistic flowfields using high-speed shadowgraphy." Matthew's advisor is Associate Professor **Trevor Moeller**.

Alicia Ratcliffe (ME) won third place with her paper, "Multi-objective design of a lightweight towed body." Alicia's advisor is Professor **John Schmisseur**. Judging in the competition was based on written paper technical content and clarity of individual presentations. In addition to the certificate award, Schwartz and Ratcliffe also received a monetary award from the AIAA Foundation.

EcoCAR 3 Team Finishes Strong

By Kathy Williams

UT's EcoCAR 3 team placed sixth overall and won several top awards in the EcoCAR 3 Year Four final competition held May 10–22.

The competition started at GM's Desert Proving Grounds in Yuma, Arizona, where the team's Camaro was put through a series of events that tested emissions, drive quality, and handling. The team then traveled to Fontana, California, to test their Camaro at the Auto Club Speedway. The team also had to compete in a 150-mile road rally through Los Angeles County.

"The entire team did an excellent job in completing the Camaro to the 99 percent buyoff stage of the vehicle development process," said Research Assistant Professor and Faculty Advisor Butch Irick. The car performed flawlessly in all of the dynamic events, winning first-place awards in several of the events."

Al Oppenheiser, Camaro program chief engineer, remarked to the team that the UT car was the only one in the competition that looked like it should be on the showroom floor.

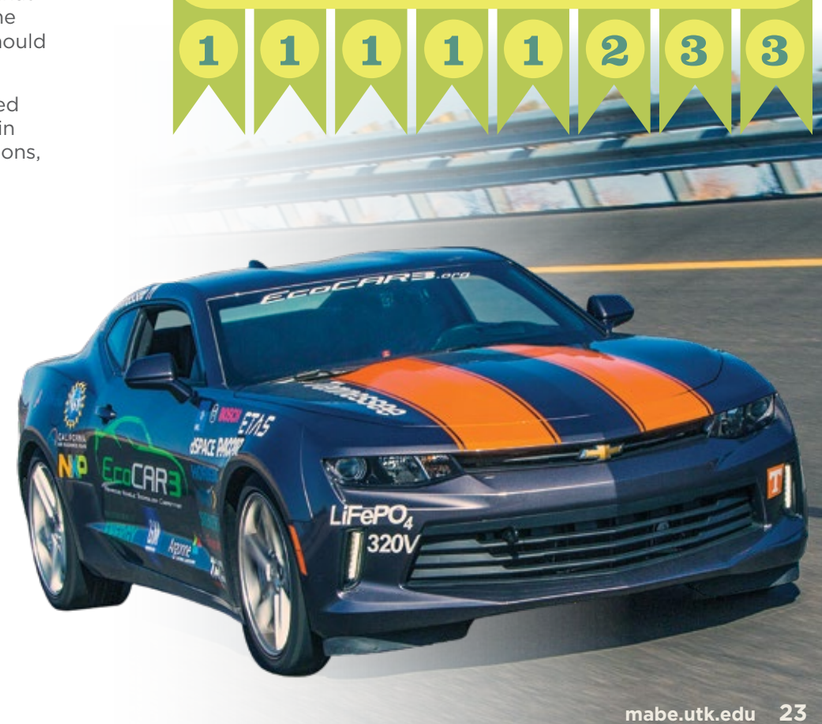
The eleven students who attended the competition performed well in the competition static presentations, with three finishes in four of the eight presentations.

In the road rally event, the team completed a 170-mile drive around Los Angeles County, being one of seven teams to complete the drive. All teams that completed the drive were hosted by GM at the Woodward Dream Cruise, the world's largest one-day automotive event, held in Detroit, Michigan, this past August.

"I'm very proud of the team's accomplishments this year," said Irick. "Besides the competition success, the success of the students in beginning their engineering careers is the most important endorsement of the program."

The team spent countless hours over the past year preparing for the competition and their hard work paid off. They excelled against the other 15 schools competing and received the following awards:

1st Place	Acceleration 50–70 mph (0.4 seconds faster than the stock vehicle)
1st Place	Braking 60–0 mph (20 feet shorter than stock vehicle)
1st Place	Advanced Driver Assistance System Demonstration
1st Place	Snap-on Workmanship and Appearance Award
1st Place	GKN Lightest Weight/Best Value Award
2nd Place	Acceleration 0–60 mph (0.1 seconds behind first place)
3rd Place	Autocross (driven by GM pro driver) Fastest Time (placed third due to a two-second penalty for hitting a cone; finished 0.4 seconds faster than stock vehicle)
3rd Place	NSF Innovation Award



Former NASA Astronaut and UT Graduate Rhea Seddon Visits UTSI

By Kathy Williams

In March, physician and retired NASA astronaut Rhea Seddon visited the UT Space Institute for a NASA mural dedication and to give a talk on the research she performed while in space.

The mural, acquired from the Johnson Space Center in Texas, depicts Seddon performing a cardiovascular experiment during her second flight in space and marks the first space shuttle mission ever dedicated entirely to life sciences.

"It was a great day and great memory," stated Seddon during the mural unveiling.

Seddon, who is one of UT's ten astronaut graduates, received her doctorate in medicine in 1973 from the University of Tennessee College of Medicine in Memphis. In 1978, she was one of the first six women to enter the NASA Astronaut program—the first time in NASA's history that non-pilots and women were accepted into the program. Seddon is a veteran of three Space Shuttle flights and has spent a total of 30 days in space.

During her time with NASA, she conducted several medical experiments on her missions and performed the first ultrasound in space. She served as a helicopter physician for operations with the search and rescue forces and NASA. She helped develop the medical kit and checklist, shuttle food system, crew medical officer training, and life sciences experiment plans for the shuttle program. She also made major contributions to the Challenger accident investigations.

Seddon is proud to have been part of the experiments and research performed during her time in space and is very happy that the mural is now on display at UTSI. She lives in Murfreesboro, so she can visit often.

Seddon retired from NASA in 1997 and then served as the assistant chief medical officer of the Vanderbilt Medical Group in Nashville for 11 years. She is a founding partner of LifeWings Partners LLC, which teaches an aviation-based model of Crew Resource Management to healthcare institutions across the US to improve patient safety, quality of care, and team effectiveness.

Seddon shares her experiences with audiences around the world as an international speaker and is renowned author of her autobiography *Go for Orbit*.

She was inducted into the Tennessee Aviation Hall of Fame in 2005, the US Astronaut Hall of Fame in 2015, the Tennessee Women's Hall of Fame in 2015, and is the recipient of a University of Tennessee Centennial Top 100 Alumni Award.

Seddon stands in front of the NASA mural on display at UTSI.

Greene Promoted to Lead Southern Company Gas

By David Goddard

In May, MABE alumna Kim Greene took the helm of Southern Company Gas as the company's chairman, president, and CEO.

"Southern Company Gas has safely served customers with clean, safe, reliable, affordable natural gas for more than 160 years," said Greene. "It's an amazing business that means a lot to Southern Company and to the communities it serves, and I'm excited to be a part of it."

A subsidiary of Atlanta-based Southern Company, it is one of the nation's largest natural gas companies, consisting of distribution and retail operations, wholesale services, and midstream operations. The company serves approximately 4.5 million customers across a multi-state footprint and operates more than 80,000 miles of natural gas pipeline.

Greene previously served as executive vice president and chief operating officer for Southern Company, a position she held since March 2014. She began her career in the engineering department of Southern Company in 1991. Over the course of her career, she has held positions of increasing responsibility in the areas of engineering, strategy, finance, and wholesale marketing.

In 2007, Greene joined the Tennessee Valley Authority at its chief financial officer. While at TVA, she also held the roles of chief risk officer, chief external relations officer, and chief generation officer before returning to Southern Company in 2013.

Greene holds a bachelor's in engineering science and mechanics from UT and a master's in biomedical engineering from the University of Alabama at Birmingham. She also holds a master's in business administration from Samford University and is a graduate of the Harvard Advanced Management program.

She is a recipient of UT's Distinguished Alumni award and is a member of both the MABE Hall of Fame and the Alabama Engineering Hall of Fame. She was named Power Gen's 2015 Woman of the Year.

Greene serves on the Board of Advisors for the Tickle College of Engineering and the Advanced Safety and Engineering Management program at the University of Alabama at Birmingham. She also serves on the Board of Directors of Valero Energy Corporation.

Department Head Matthew Mench presented Kim Greene with a plaque when she was inducted into the MABE Hall of Fame in 2016.

Alumni Spotlight: Thomas Noyes

By Kathy Williams

In 2014, Thomas Noyes (AE, ’87) started what he considers the most rewarding job of his career when he founded his own company, Commerce Signals. That same year he was named one of the Top 25 Innovators to Watch in Financial Services by Bank Innovation. While the finance sector may seem far removed from aerospace engineering, his AE degree was the foundation that led him from UT to NASA and several other interesting jobs.

Thomas and his family at a UT football game. (L-R) His son-in-law Jeremy, daughter Hillary, wife Penny, son Chris, Thomas, and son John.

Noyes grew up in Michigan and Kingsport, Tennessee, when the space program was booming. Rockets and space became his passion and becoming an aerospace engineer his dream.

“Space ignites our imagination and was key in pulling me in to math and science,” Noyes said.

In 1983, Noyes enrolled at UT as one of 210 AE freshmen that year, marking the first time they outnumbered mechanical engineering students. However, that number dropped to just 13 in his graduating class.

“If freshman could only understand the fun they will have in their last year, more would stick with the program and graduate,” said Noyes, whose best memories are from his senior year.

“The senior project was fantastic,” Noyes said. “I can still remember the name of my senior design project—S.C.O.U.T. (Small Combat Operations and Utility Transport). Getting to work with fellow AE majors on a team project not only allowed me to apply everything I had learned, it helped me build appreciation for all the professors who helped give me the basis for applying those new skills.”

Noyes was hired right after graduation by NASA’s McDonnell Douglas Space Systems.

“I worked on the space shuttle guidance navigation and control, which is a really cool thing to do,” Noyes said. “I thought it was the greatest job in the world to get to work with astronauts every week and have Neil Armstrong’s old house right across the street, with seven other astronauts within a block.”

Noyes was responsible for the space shuttle’s ascent and descent guidance and worked directly with astronauts in both evolving and testing hardware. His first year at NASA was the beginning of the transformation away from mainframe computers to small Unix-based computers.

“Obviously, we couldn’t launch the shuttle to test every new software change we planned, so simulations were a large part of what we did, both in building the simulation software and in running the analysis,” Noyes said.

In 1994, although he loved the NASA team and culture, Noyes was ready for a career change.

“Life is short, so I focused my energy on areas that were new, emerging, and where my skills could have a meaningful impact,” Noyes said. “Engineers love to solve problems; it is how we are wired.”

After obtaining his MBA from the University of Houston, he was hired by First Union Corporation where his team built the world’s first online bank. He went on to hold positions at Oracle Corporation, Wachovia Corporation, and Citigroup. He also worked with Google in 2011, leading strategy and acquisitions for the Google Wallet program.

All these experiences led Noyes to start Commerce Signals, the core of which is based upon what he learned at UT. “Signals” is a combination of systems and controls, design of experiments, and economics (his minor).

Where Google indexed the world’s public data, they hope to index the world’s private data for the benefit of the data owner.

Noyes hasn’t completely given up his involvement with space and NASA. After the Columbia disaster in 2003, he appeared on CNN, ABC, and Fox News as a spokesperson for NASA. View some of his appearances at **www.tomnoyes.com/shuttle**.

Family Vol-ues

By Laura Tenpenny

Family and a Frisbee facilitated the career path of then recent UT graduate, Bryan Haynes (PhD/ME ’91, MS/AE ’87, BS/AE ’85). Like many before him, after completing his PhD, Haynes attended a university job fair. Mid-fair, he took a break to eat lunch with his wife and daughter. “My daughter was getting fussy, and my wife asked me to go get a Frisbee so the baby could play with it. Turns out Kimberly-Clark was handing out Frisbees at the fair,” Haynes recalled. To soothe his fussy three-month-old, Haynes went to the Kimberly-Clark Corporation booth to bring back one of the Frisbees the representatives were giving away. This, and a display photo of a meltblown die, launched a conversation with one of the reps and ultimately his career at Kimberly-Clark.

> “UT provided me unmatched technical competency and a practical viewpoint of real-world engineering”
>
> —Bryan Haynes


Dave Rousse, INDA president, presents award to Bryan Haynes, senior technical drector in global nonwovens, Kimberly-Clark Corporation.

Now the senior technical director for global nonwovens, Haynes has been with Kimberly-Clark since 1992 and has built an impressive career spanning multiple roles and responsibilities. He has spent the majority of his time on front-end innovation, discovering new and better process technologies. His innovative solutions have earned him 43 patents, 13 trade secrets, and helped establish the meltblowing technology used by Kimberly-Clark’s commercial machines around the world. Meltblowing produces nonwoven material for various purposes, from water treatment to apparel, but Kimberly-Clark focuses mainly on products for home use.

“The meltblown designs I helped develop have provided a competitive advantage in both cost and quality for Kimberly-Clark,” Haynes said.

For his committed and creative technical prowess in polymer processing and process methods in the nonwovens industry, Haynes recently received the 2017 Lifetime Technical Achievement award from the Association of the Nonwoven Fabrics Industry. In signature fashion, he recognized in his success collaboration from his colleagues, whom he also refers to as family.

“You do not do things alone at Kimberly-Clark, in my experience,” Haynes said.

Haynes also gave due to his alma mater and credited the industry expertise of his professors.

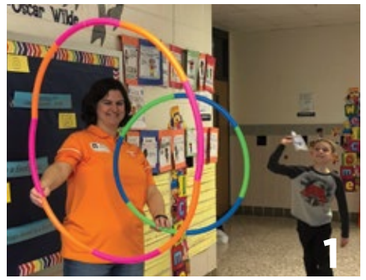
“UT provided me unmatched technical competency and a practical viewpoint of real-world engineering,” Haynes said. “My freshmen engineering courses were challenging, and I still use the fundamentals I learned then to this day.”

Haynes has continually given back to his Volunteer family, having served as the recruiting representative to UT for his company for many years, as an adjunct professor in MABE, and as an advisory board member for MABE.

Haynes credits his recent award and successful career to the support of the people with whom he has studied, worked, and made a family. To complete this model of humble success, he adds “would-be engineers should be brave, always show respect, and stay curious.”

Send Us Your Photos

Do you have any photographs from your time as a student at UT? If so, we'd love for you to share them with us. MABE is collecting old photos of research projects, lab and classroom spaces, students, faculty, staff, and campus. Please send digital copies to ***williamk@utk.edu***. We look forward to rediscovering our past with your help!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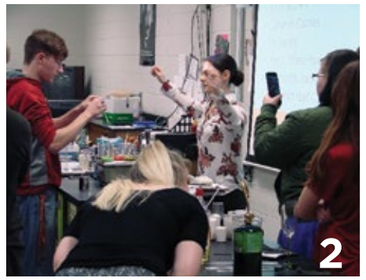
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Around the Department

1: Jessie Rogers Zeanah Faculty Fellow Stephanie TerMaath did an outreach project with third-graders at Sanders Corner Elementary School in Ashburn, Virginia.

2: PhD student Julie King gives her "Candy Pull" demonstration to students at Tullahoma High School. Photo by Lee Leonard, UTSI.

3: AIAA student group members took a field trip to Lockheed Martin in the spring.

4: Hall of Fame member Katherine Van Hooser and MABE Board of Advisors member Sam Dougherty enjoying the MABE Awards Banquet at the Foundry.

5: BME alumna Taylor Schlotman (center) met up with UTSI grad and NASA Astronaut Randy Bresnik (left) and NASA astronaut Mark Vande Hei (right) at the International Space Station Research and Development Conference.

6: L–R, Interim Chancellor Wayne Davis, UTSI Director Mark Whorton, and UT Athletic Director Phillip Fulmer tour the UTSI campus.

7: Estabrook Hall becomes a memory as it makes way for the new $129 million, 228,000-square-foot engineering complex that's expected to open in late 2021.

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 with your time, and have a desire to connect with our students and help prepare them for professional careers, you can be a mentor.

For consideration, sign up at ***tiny.utk.edu/MABEMentor***

Join Carter. Join the Journey.

"One of my greatest learning experiences at UT has been studying circuit mechanics and thermodynamics abroad in London, a trip that private gifts helped me attend. Thank you to everyone who is donating to UT scholarship funds and investing in the future of our nation."

—Carter Breeding, merit-based scholarship recipient.

Invest in the journey and help sudents like Carter take advantage of international experiences. Call 865-974-3011 or visit engr.utk.edu/give.

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