



FALL 2016

TTICKLE
COLLEGE OF ENGINEERING

DEPARTMENT OF
MECHANICAL, AEROSPACE &
BIOMEDICAL ENGINEERING

Alumni Newsletter

UT's Advanced Manufacturing Center and Engineering Annex Holds Grand Opening



Also in this issue...

Guide Glass: wearable technology has potential to make a huge impact on society, DENSO once again helping UT, MABE holds first senior design symposium, Three new members added to MABE Hall of Fame

Contents

Department Head's Welcome.....	1
UT's Advanced Manufacturing Center and Engineering Annex Holds Grand Opening.....	2
Guide Glass.....	3
MABE Holds First Annual Senior Design Symposium.....	4
Faculty News.....	5
Undergraduate Advising Center Opens.....	8
MABE Holds 9th Annual Honors Awards Banquet.....	9
Student News.....	11
MABE Student Athletes 2016-2017.....	14
Joshua Dobbs Begins His Final Year of College and Football.....	15
Three New Members Added to MABE Hall of Fame.....	19
Alumni Updates.....	20
Alumni Spotlight: Paul Bunch.....	21
Memories from a MABE Alum.....	22

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From the Department Head



Thanks for taking a look at the fall 2016 issue of the Department of Mechanical, Aerospace and Biomedical Engineering (MABE) Alumni Magazine. I hope you enjoy it!

Our momentum continues as a department, with continual expansion and enhancement of our graduate programs. The last year marked a new record for the department in external research commitments and total enrolled PhD students, as we continue to see the needle move us forward as an emerging national research powerhouse. Last year, we hired our second Governor's Chair Professor, Uday Vaidya,

to be the Chief Technology Officer of the \$259 million dollar Institute for Advanced Composites Manufacturing Innovation (IACMI), the fifth Institute in the National Network of Manufacturing Innovation, supported by the U.S. Department of Energy's Advanced Manufacturing Office. IACMI is committed to accelerating development and adoption of cutting-edge manufacturing technologies for low-cost, energy-efficient manufacturing of advanced polymer composites for vehicles, wind turbines, and compressed gas storage. IACMI partners with Oak Ridge National Lab and includes over one hundred other members of industry as partners. As part of the expansion of facilities on the University of Tennessee side of the partnership, the Fibers and Composites Manufacturing Facility and Engineering Annex recently held a grand opening. The new 6,300 ft² facility features several laboratories with cutting-edge machines devoted to advanced manufacturing of composites typically containing carbon fiber and plastic resins. Dr. Vaidya is an internationally known leader in composites and manufacturing, and to cap off the year of significant achievement, he was honored during a special ceremony as the 2016 Society of Plastics Engineers (SPE) Composites Division Composites Person of the Year.

In the undergraduate programs, we held our first public senior design symposium in the spring, where the results of the year-long senior design projects were displayed to the community and sponsors. Recent improvements to the senior design program have included all new facilities such as machine shops, a conference room, workbenches and tools. This has been facilitated by the tremendous growth in external sponsorship of our projects from many different local and nationally known companies. Other projects help spur entrepreneurial thinking (The "VolTank"), or help the community through special projects.

As an alumnus, if the company you work with is interested in pursuing a senior design project with MABE, please contact me. We are always looking to add new projects and diversity of options for all our programs.

Undergraduate advising has also been significantly upgraded in the past year with the first two professional advisors in the program. These new additions have professional training in academic advising, and will be located in a newly renovated MABE advising center when renovation is complete. This centralization of our academic advising will help ensure all our undergraduates get prompt, correct advice and guidance in navigating the curriculum.

Finally, please keep sending us your pictures and sharing stories of your days at UT in Knoxville or 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 (on Twitter)

UT's Advanced Manufacturing Center and Engineering Annex Holds Grand Opening

More than 100 people were on hand recently for the opening of a new center at UT and some of the products produced by it.

The 6,300 ft² Fibers and Composites Manufacturing Facility and Engineering Annex, located on White Avenue, features several laboratories with cutting-edge machines devoted to advanced manufacturing of composites typically containing carbon fiber and plastic resins.

The center's opening is the latest success for UT's College of Engineering, Oak Ridge National Laboratory, and IACMI—the Composites Institute, which are pushing the frontier of manufacturing capabilities, said Wayne Davis, dean of the College of Engineering.

"About eight-and-a-half years ago I met with ORNL's Craig Blue, who said that advanced manufacturing would be the next big thing," said Davis. "We've been able to add faculty in that area, particularly with our Governor's Chair program with ORNL, which has allowed us to be real leaders in this area and an economic strength for the region."

Officials at the ceremony repeatedly cited the positive effect that UT, ORNL, and IACMI have had on Tennessee's economy. IACMI alone represents a multi-million dollar investment in the local economy. Also, the alliance of UT, ORNL, and IACMI has attracted partnerships with a variety of industries, ranging from aerospace and automotive to energy and power, over the past few years.

"The composites manufacturing industry is changing rapidly, and we're at the epicenter of that change," said Vice Chancellor for Research and Engagement Taylor Eighmy. "That's the truly important thing about having facilities like this one—the impact it has on East Tennessee. The advanced manufacturing ecosystem is growing here, and we look forward to it."

MABE Governor's Chair in Advanced Composites Manufacturing Uday Vaidya will oversee most of the research in the newly renovated space, which previously served as a center for nonwoven fibers. He said the center's state-of-the-art facilities will bring a bonus to students: more hands-on experience with the wave of changes coming to manufacturing.

"Students will be able to get their hands dirty—work their way through the system from concept to manufacturing a final product," said Vaidya. "We have the chance to be the best place for experiential learning."

While the bulk of the building will be what Craig Blue called the "cornerstone of composite manufacturing in the South," it retains some of its engineering heritage thanks to the EcoCAR team.

UT's team, which has participated in all but one of the EcoCAR competitions held in the past three decades, has space in the building. The facilities will also give the EcoCAR team more open area to run its tests.



Governor's Chair in Advanced Composites Manufacturing Uday Vaidya speaks to guests at the grand opening ceremony. Vaidya will oversee most of the research in the newly renovated space.



Visitors tour the new Fibers & Composites Manufacturing Facility & Engineering Annex during the grand opening ceremony.



The new sign posted outside of the new facility.



College of Engineering Dean Wayne Davis welcomes guests at the grand opening ceremony.

Guide Glass

By David Goddard



A photo of the Guide Glasses—a unique device that could improve mobility.

Wearable Technology has Potential to Make a Huge Impact on Society

Chirp. Chirp. Chirp.

What's that sound? If you are standing at an intersection in the heart of a major US city, it's most likely an accessible pedestrian signal—a device that provides visually impaired people with audible cues about the status of a walk signal.

Obviously the repetitive sounds are better than nothing, but they can't actually tell someone whether it's safe to cross the street or not. Reckless drivers, objects in the crosswalk, and potholes can present dangerous obstacles.

But what if there were a way to alert blind pedestrians to these potential pitfalls? That's exactly the question Jindong Tan is trying to answer.



Dr. Jindong Tan

Tan, a professor in the UT Department of Mechanical, Aerospace, and Biomedical Engineering, is working on a unique device that could improve mobility without being overly cumbersome. It's called Guide Glass.

The wearable tech resembles a pair of sunglasses, with the addition of a small GoPro camera on one side. The camera and a variety of sensors are connected to an onboard microprocessing unit

that converts the visual information into data. Proprietary software analyzes the data to evaluate the surroundings in real time. The results are translated into words and transmitted to the wearer through an earpiece.

Guide Glass might look a bit like the ill-fated Google Glass product, but "we actually filed paperwork on ours before Google came out with theirs," Tan said. "It just happened to work out that the designs are similar."

Tan's team began by studying how the eye transmits signals to the brain—where the decisions about movement are made.

For example, a person standing on the curb unconsciously calculates whether or not they have time to cross the street based on what they see. "If a person's brain could make such a calculation, so could a computer," Tan rationalized.

They placed a premium on creating a practical compact design using small but powerful components.

"Mobility is about three things: direction, range, and access," Tan explained. "Being able to address all of those things at once is the key to truly opening up the world for the visually impaired."

Unfortunately, the most common methods available to help visually impaired people navigate can't address all three at the same time. Guide dogs can help with direction and range but can't warn of access restrictions like low-hanging branches. Walking sticks help users detect obstructions and distance but fall short of providing direction.

Finding a way to deliver all three elements concurrently with a gadget the size of a cracker is the challenge Tan and his team are facing. "The current version of Guide Glass is able to convey angle, depth, distance traveled, whether a door is open, things like that," he said. "It tells the person the info they need, when they need it."

Tan hopes improvements in GPS technology will eventually allow further refinements, leading to even more precise calculations and directions.

While the promise of Guide Glass represents a tremendous boon for those with permanent visual impairments, there may also be applications for those in situations where vision is temporarily obscured.

Firefighters in a smoky building, rescue personnel in a blackout, or police entering a darkened crime scene could benefit from the device since it doesn't rely on light to make measurements.

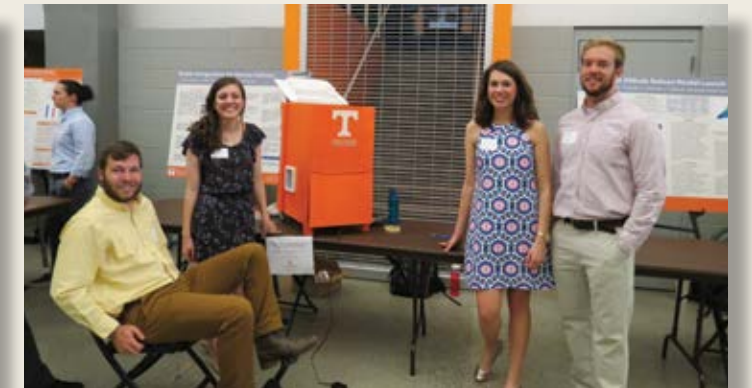
"The possibilities for making a big impact on society are exciting," Tan said. "We just need to secure enough funding to bring it to market." With proper backing, he believes Guide Glass could begin public trials as soon as 2018.

Even with the obvious positive implications for society, Tan explained, money has been hard to come by because investors are looking for big profit margins. He noted that they are constantly on the lookout for federal dollars, and the Smith-Kettlewell Eye Research Institute has recently expressed interest.

Until the right partner is found, the team will remain focused on improving Guide Glass to ultimately achieve their vision of helping those unable to see on their own.

MABE Holds First Annual Senior Design Symposium

By Kathy Williams



On April 21st, more than 300 people filled the Thompson-Boling Arena concourse for the Department of Mechanical, Aerospace and Biomedical Engineering's (MABE) first annual senior design symposium.

Thirty-seven teams of seniors participated in the expo and showed off the projects they have been working on during their final year as undergraduates. Projects included a virtual reality forklift training system, a foot-pedaled, portable vaccine refrigerator that can be carried on a person's back, a detachable percutaneous endoscopic gastrostomy tube, and an aircraft fuselage cleaning system that can reduce time and injury.

Two of the teams were part of an entrepreneurial concept project called VolTank, which is modeled after the popular television series, Shark Tank. In these projects, the teams co-develop a prototype and business plan for a potential product they have conceived of.

All teams displayed posters, prototypes and gave presentations during the expo. Cash prizes were given to the top three posters, and the crowd, which included fellow classmates and company sponsors, had the opportunity to vote on their favorite project in the people's choice award competition.

The winning teams were:

1st Place Poster Competition
3D Printed Brain Aneurysm Model for Aneurysm Clipping Practice

Team members: Logan Chesney, Patrick DiNicola, Morgan Howard, and Jananii Vaz. Faculty advisor: Dr. Jeff Reinbolt

2nd Place Poster Competition
Autonomous Material Handling

Team members: Ben Herwehe, Seth Hubler, Drew Marlow, and Turner Williamson. Faculty advisor: Dr. Bill Hamel

3rd Place Poster Competition
Your Omni Directional Automobile

Team members: Tesfaye Abdela, Matthew Davis, Benjamin Hardt, Ryan Klug, and Kelvin Mbugua. Faculty advisor: Steve Foster

People's Choice Award
VolTank: Arctic Blast

Team members: David Russell, David Priddy, Andrew Marini, and Abdulrahman Alharthi. Faculty advisor: Dr. Matthew Mench

Fifteen industrial sponsors, including Boeing, DENSO, Eastman, Lexmark, and the National Institute of Health, funded the senior design projects.

The symposium was organized by Dr. Larry Sharpe. "The MABE senior design symposium was a tremendous success. It was very impressive to see the wide array of projects completed by the mechanical, aerospace, and biomedical engineering teams. The prototypes and posters presented by the student teams showcased the hard work and effort that they put into these yearlong projects," Sharpe said.

MABE plans to make the senior design symposium an annual event. Next year's symposium is scheduled for April 27, 2017.

Faculty News



Dr. Brett Compton

Compton Selected for U.S. Air Force Research Lab Summer Faculty Fellowship Program

Over the summer, MABE Assistant Professor Brett Compton participated in the 2016 U.S. Air Force Research Lab Summer Faculty Fellowship Program.

The fellowship program offers 8-12 weeks of hands-on exposure to faculty members at U.S. colleges and universities to perform high-quality research at Air Force research facilities. The program also encourages relationships between the program participants and the scientists and engineers at the research facilities.

Compton spent 8 weeks as a faculty fellow at the Air Force Research Laboratory (AFRL) at Wright-Patterson Air Force Base in Ohio and conducted research focused on additive manufacturing of flexible conductive hybrid materials alongside an AFRL scientist using their state-of-the-art facilities.

"It was an honor to be selected to participate in the Summer Faculty Fellowship Program at AFRL," said Compton. "I learned a lot about the inner workings of the lab, formed new collaborations with expert scientists, and came away with new ideas for my own research at UTK."



Dr. Matthew Mench

Mench Receives Translational Research Award

MABE Department Head Matthew Mench received a Translational Research Award at the College of Engineering Annual Awards Banquet last April.

The award was established in 2013 and recognizes faculty members whose research has achieved societal benefit through the development of intellectual properties through licensing.

The award was shared with CBE Professor Tom Zawodzinski, and comes from their work with WattJoule Corporation. The company was founded in 2012 and focuses on cost effective energy storage through flow battery technologies.



Dr. James Coder

Coder Joins MABE Faculty

Dr. James Coder joined the MABE department this fall as an assistant professor. Coder received his Ph.D. in aerospace engineering from Penn State University in 2014 and worked as a research associate in Computational Mechanics at the Penn State University Applied Research Laboratory for two years before joining MABE.

"It is an honor to be a part of this department and I am looking forward to building collaborations with my new colleagues both in Knoxville and at UTSI," said Coder.

The VolVision 2010 initiative, which is a plan to make the university a top 25 school, is part of what attracted Coder to the University of Tennessee. Coder said, "When I first visited campus, I saw there was a tangible commitment to make it happen, not just the rhetoric about wanting to improve."

Coder's background is in aerospace engineering and his future research plans focus on computational fluid dynamics and applied aerodynamics. His current projects include rotorcraft aerodynamics, hypersonic boundary-layer transition modeling, and CFD-based design for natural laminar flow.

He started teaching for the first time this semester and so far is enjoying the experience and is impressed with the students he describes as being highly motivated and dedicated to getting the most out of their courses.

Coder's goal is to prepare rising engineers for the future and the new and exciting challenges that lie ahead of them. He also plans to build a thriving, sustainable research program in computational aerodynamics that undergraduate and graduate students will benefit from.

By Kathy Williams

UT-Developed Wearable Sensors Could Improve Treatment for Motor-Skill Impairments

Every year in the United States almost 800,000 people suffer a stroke, an affliction which results in blood flow being cut off from the brain.

Strokes can impair mobility, speech, and cognition, and the recovery process, and the ability to return to normal life can be daunting for survivors and their families.

New research being led by University of Tennessee, Knoxville, mechanical engineers could soon change that.

Dr. Eric Wade, an assistant professor in the Department of Mechanical, Aerospace, and Biomedical Engineering, recently led a team that developed a way to measure functional motor ability in those who have suffered a stroke. Funding from the National Institutes of Health supported that breakthrough.

Wade said the study shows that stroke patients, like everyone else who goes to a doctor, tend to overstate the amount of rehab that they do on their own.

His team helped develop wearable sensors that track how survivors use their upper limbs when they aren't being observed or supervised by their doctor. This knowledge could greatly improve how the design of patient treatment plans.

"It's much the same way that someone might tell their doctor that they are watching what they eat, or that they are getting plenty of exercise when they really aren't," said Wade. "Many stroke patients were finding ways to compensate for the motor skills they'd lost rather than doing the rehab work they needed to be doing, with the result being that their recovery took much longer if it happened at all."

UT's team focused on the quality of exercise done, not just the amount done.

Through their qualitative monitoring approach, the researchers hope to gain a better understanding of how individual exercises affect patients. That will allow researchers and medical personnel to better predict which activities are most beneficial to specific patients on a case-by-case basis.

"The most important thing is the ability to build models that can predict health outcomes," said Wade. "That would give everyone involved better tools for prescribing patient treatments."

If all goes as planned, Wade said the team could use their sensors to design technology that would specifically improve motor ability.

He said such improvements would help not only stroke patients, but anyone with a motor skill impairment, such as individuals with Parkinson's disease, Alzheimer's disease, and dementia.

UT's engineering researchers have partnered with the Brain and Spine Institute at UT Medical Center, Dr. Russ Langdon, the Neuroscience Network of East Tennessee, and UT's Office of Research and Engagement. Pain Consultants of East Tennessee played a vital role by helping connect researchers to stroke patients and other individuals with brain and spinal issues.



Dr. Eric Wade

By David Goddard

MABE Faculty and Students Receive Awards at Chancellor's Honors Banquet

This past spring, hundreds of people gathered for the university's largest recognition event of the year—the Chancellor's Honors Banquet. The annual banquet recognizes the university's outstanding faculty, staff, and students. A faculty member and three students from MABE were honored for their accomplishments at this year's banquet.

MABE Assistant Professor Stephanie TerMaath received the 2016 Angie Warren Perkins Award, which is presented to someone who demonstrates outstanding leadership in campus governance or administration. TerMaath joined

the MABE faculty in the fall of 2014. According to her colleagues, she has fundamentally improved the entire aerospace program.

Caroline Black, Graham Taylor and Sofy Weisenberg received a 2016 Extraordinary Professional Promise award, which is awarded to undergraduate or graduate students who demonstrate professional promise in teaching, research or other contributions. Black and Weisenberg are graduate students in MABE and Taylor received his PhD in biomedical engineering in the spring.



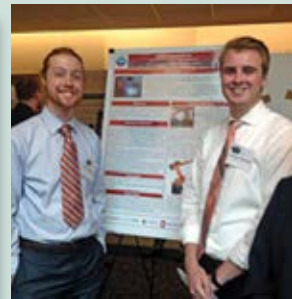
Sofy Weisenberg (left) and Dr. Stephanie TerMaath (right) at the Chancellor's Honors Banquet



Left to right: Caroline Black, Graham Taylor, and Sofy Weisenberg show off their Extraordinary Professional Promise Awards.



Denzel Bridges presenting his poster at the Industrial Advisory Board.



Samuel Robertson and Joshua Penney presenting their poster at the Industrial Advisory Board.

UT Hosts Industrial Advisory Board in Conjunction with Ma2JIC

In 2015, the University of Tennessee, Knoxville, became the newest site of the Manufacturing and Materials Joining Innovation Center (Ma²JIC). Ma²JIC is a NSF funded Industry/University Cooperative Research Center (I/UCRC), established six years ago with Colorado School of Mines, Lehigh University, Ohio State University (OSU), and the University of Wisconsin as the original sites.

In early August 2016, UT hosted the semi-annual Industrial Advisory Board (IAB), bringing over 100 participants from industry, national laboratories, and academia to Knoxville.

MABE Faculty associated with the UT Knoxville site include Drs. Suresh Babu, Bill Hamel, Anming Hu, Madhu Madhukar, and Stephanie TerMaath.

Students funded by the site projects are working on precompetitive research supported by industry and the focus of the meeting is on student

presentations, both oral and posters, updating the IAB on project progress. One important goal of the I/UCRC program is to produce students trained for the specific needs of industry and students are mentored both by faculty that participate in the program and industrial members.

By Claudia Rawn

DENSO Once Again Helping UT's EcoCAR Team Succeed

By David Goddard



DENSO Foundation president Doug Patton (l) and Brian Crawford (r) from DENSO Manufacturing Tennessee present a check to Dr. Matthew Mench and Dr. Butch Irick (center l-r).

The University of Tennessee, Knoxville, EcoCAR team has once again gotten support from a familiar partner: DENSO has provided the team with \$50,000.

The aid from the Blount County-based business will help the team purchase a truck to transport their competition car.

As part of the first year of the current round of competition, that car—a 2016 Chevrolet Camaro—has been modified to the point that it is not currently street legal, making the transport vehicle necessary.

"Teams are prohibited from driving the vehicle on public highways until a year from now," said Butch Irick, the team's faculty adviser and a research assistant professor in the MABE department. "The truck will take the car to test facilities, outreach events and competition, so it's absolutely vital to us."

Doug Patton, DENSO Foundation president, and Brian Crawford, from DENSO Manufacturing Tennessee, met with UT students on the EcoCAR 3 team to present a check and talk about the importance of the competition.

Patton said he values the hands-on experience the program offers students.

He also told the team he places a high emphasis on encouraging youth to pursue an education in science, technology, engineering and mathematics fields, and he encouraged them to display the Camaro around the Knoxville area to excite the next generation of automotive engineers.

All told, DENSO has now provided support and aid worth more than \$400,000 to the team over more than a decade of sponsorship.

EcoCAR 3, the current competition, is a four-year collegiate engineering program that builds on the successful 26-year history of the U.S. Department of Energy's Advanced Vehicle Technology by giving engineering students the chance to design and build advanced vehicles that demonstrate leading-edge eco-friendly automotive technologies.

General Motors provides each of the 16 competing teams with a Chevrolet Camaro as well as vehicle components, seed money, technical mentoring and operational support.

The DOE and its research and development facility, Argonne National Laboratory, provide competition management, team evaluation and logistical support.

EcoCAR 3 provides invaluable experience and training to promising young minds entering the North American job market.

Undergraduate Advising Center Opens

By Kathy Williams

The undergraduate students in the MABE department have a new place to go for academic advising with the recent renovation and expansion of the department's Undergraduate Advising Center.

The center was opened to provide students with a centralized location and dedicated staff who can meet their academic advising needs. Previously, students depended on faculty members and department staff to answer questions and provide direction on which classes to take. Now, having a centralized location allows faculty and staff to focus on classroom education and research, and leaves the advising up to professionally-trained staff members Academic Advisor Roger Gray and Senior Academic Advisor Jennifer Hartwig.

Many students see advising as a required meeting where they are told which classes to take and then get cleared to take those classes. "It is more than that," explained Gray. "While the curriculum does have a list of requirements, students often have more options that they may not be aware of and we want to give them the information they need to make the best educated choices for themselves. This can include things such as minors, study abroad opportunities, and information about professional planning."

The goal of the center is to teach the students how to help themselves and take ownership of their own academic and professional plans.

The center will soon be moving in to its permanent location on the third floor of the Dougherty Engineering Building. The newly renovated space will include private advising offices and a reception area.

"Jennifer and I are looking forward to moving to a better location soon," said Gray. "While we are still both learning, I feel quite confident in saying that advising in MABE is rapidly improving and constantly progressing."



Roger Gray



Jennifer Hartwig

We need your help!

If you have professional experience as an engineer and you are interested in being a professional mentor to one of our students, please e-mail Matthew Mench at mabementor@utk.edu to find out more information.

New Professional Mentoring Program Established

Up until recently, most of the professional advising and mentoring MABE students received came from faculty. That changed this fall with the establishment of the Professional Mentoring Program.

The new program connects students with a practicing engineer who acts as a professional mentor. The mentors are from all over the country, and meet with students either in person, via Skype, or on the phone to establish a relationship, and offer career advice.

The initial group participating in the program is made up of twelve students and ten external mentors.

"We have such a tremendous group of alumni who truly love our school and program," MABE Department Head Matthew Mench said. "This is a way for them to give back in a very meaningful way, connect with the students, and help them prepare for professional careers. In some cases the relationship has already enabled a connection that has resulted in an opportunity the student would not otherwise have."

Some mentors are already exploring ways to help the students beyond meetings and providing career advice, such

as providing summer internship and co-op opportunities or teaming up to work on a senior design project.

"We are impressed with the vision to develop such a program for MABE," said Mike Wilder, Professional Mentor. "In the end, both MABE and the industries will benefit from this program."

Sam Dougherty, a member of the MABE External Board of Advisors and Professional Mentoring Program Chair, provided feedback from the current mentors. "We are enjoying the experience talking with our student," Dougherty said. "Each of us have said we look forward to making face-to-face contacts on campus soon. We have been discussing general career paths and a variety of engineering topics. We are not following specific or rigid schedules, and the students are guiding the topics."

Mench hopes to identify more alumni willing to be mentors and expand the opportunity to all junior and senior level students in the future.

By Kathy Williams



MABE Holds 9th Annual Honors Awards Banquet

By Kathy Williams



Tennessee Commissioner of Economic and Community Development Randy Boyd was guest speaker for the event.



Guest speaker Randy Boyd (left) and MABE Professor and Head Dr. Matthew Mench at the honors banquet.

On April 21, 2016, the MABE department held its 9th Annual Honors Awards Banquet at The Foundry with over 150 people in attendance.

Randy Boyd, Tennessee Commissioner of Economic and Community Development and founder of Radio Systems, was the guest speaker and awards were presented to MABE's outstanding students, staff and faculty.

This year's award recipients were:

Students

Jared Carnes, *Outstanding Aerospace Engineering Junior Award*

Gary Collins, *Outstanding Aerospace Engineering Junior Award*

Reza Djeddi, *Outstanding Graduate Student Award*

James Fitzsimmons, *Outstanding Mechanical Engineering Junior Award*

James Ferguson, *Outstanding Mechanical Engineering Senior Award*

William Fredebeil, *Outstanding Mechanical Engineering Junior Award*

Yasser Ashraf Gandomi, *Outstanding Graduate Student Award*

Caroline Hill, *Outstanding Mechanical Engineering Junior Award*

Andrew Kaminsky, *Student Leadership and Outreach Award*

David Klumpe, *Outstanding Mechanical Engineering Senior Award*

Stephen Lagutchik, *Outstanding Mechanical Engineering Junior Award*

David Marsh, *Outstanding Mechanical Engineering Junior Award*

Sara Parker, *Outstanding Biomedical Engineering Junior Award*

Shelby Sievers, *Outstanding Biomedical Engineering Senior Award*

Daniel Splane, *Outstanding Aerospace Engineering Senior Award*

Justin Splane, *Outstanding Biomedical Engineering Junior Award*

Graham Taylor, *Innovation Award*

Nima Tamaddoni, *Innovation Award*

Staff and Faculty

Mark Barker, *Excellence in Teaching Award*

Bill Hamel, *Outstanding Senior Faculty Award*

Ruthann Moyers, *Outstanding Staff Award*

John Schmisser, *Outstanding Senior Faculty Award*

Stephanie TerMaath, *Outstanding Junior Faculty Award*



Faculty and staff at the MABE Annual Honors Awards Banquet.



MABE faculty, staff and students enjoyed the honors banquet in April.



The MABE Annual Honors Banquet was held at the Foundry.



MABE Department Head Dr. Matthew Mench (second from left) and MABE Associate Head for Undergraduate Programs Dr. Toby Boulet (center) with Dr. Mark Barker (right), recipient of the Excellence in Teaching Award.

Student News

Team competes in Design Build Fly Competition

Since 2008, the University of Tennessee (UT) has been competing in the AIAA Student Design Build Fly competition alternately held in Tucson, AZ and Wichita, KS. The goal of the competition is for the students to design, build, and fly an electrically powered model airplane in an international competition consisting of approximately eighty teams.

Each team must build an airplane to successfully complete three challenging missions, which change every year, and there is a very high failure rate. On average, only approximately 60% of the teams manage to complete a



The VOLocity team with the airplane they built for the competition.

single mission. In 2016, that number decreased to 47.5%.

At the 2016 competition, the team from UT, named VOLocity, managed to complete two of the three missions and when combined with their report score ended up with 28th place—the highest finish of any UT team. Their previous highest was 34th place.

VOLocity, which is made up of MABE students and led by MABE Senior Lecturer Rob Bond, plan to build on this year's success and as they prepare for the next competition in Tucson, AZ in April 2017.



The VOLocity built airplane in flight.

BME Design Team Wins BMEidea Competition

By Kathy Williams

The BME Design Team, which is made up of seven graduate students, has cause to celebrate. The team, now being referred to as the FastCast team, won first place in



The FastCast team posing with the BMEidea trophy (from left) Reza Abiri, Graham Taylor, Caroline Black, John Till, Guru Venkatesan, Richard Steiner, and Tony Nguyen.

the BMEidea competition. The team beat out other top universities from across the country.

The first place prize includes \$10,000 and the BMEidea trophy, which is the equivalent of the Stanley Cup of this competition. The team will keep the trophy for one year and then it will be passed on to the winner of next year's competition.

The team, who is led by MABE Associate Professor Xiaopeng Zhao, won the competition with their FastCast design. The FastCast is an orthopedic cast they say will improve patient experience and save cost and time. The FastCast overcomes a lot of the problems associated with the common cast that's made of plaster by being easy to apply and remove, waterproof, allowing visualization and breathability of skin, and applicable to any extremity. The FastCast uses a new "particle jamming" technique that makes application possible in less than two minutes compared to the 30-60 minutes it takes for a plaster cast.

In addition to the first place prize, the team also won the TREAT award, which includes an additional \$1,000.

The BMEidea trophy is currently on display in room 410 of the Dougherty Engineering Building.

MABE Students Win First Place and Overall Gold at EURēCA Event

MABE students Jenny Patel and Madeline Stanbridge received first place and overall gold at the 20th Exhibition of Undergraduate Research and Creative Achievement (EURēCA), which took place April 11-15, 2016, in Hodges Library on the University of Tennessee campus.

Their poster, "A Comparative Study of Cellular Calcification within the Male and Female Aortic Valves," was one of forty-five posters exhibited at the event.

MABE Assistant Professor Zannatul Ferdous is the faculty mentor for this project.

Rogers Attends Workshop at Los Alamos National Laboratory

Brandon Rogers, a first-year PhD student in the MABE department, was one of twenty-four students selected from across the United States to attend the 2016 Computational Physics Student Summer Workshop this past June 13-August 19, at Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico.

The 10-week workshop brings together a diverse group of exceptional undergraduate and graduate students for informative lectures, teambuilding, mentoring, and the opportunity to work closely with LANL staff on relevant projects that may end up in articles or conference presentations.

The selection process for this year's workshop was very competitive with 80 highly qualified applicants, so to be selected was a great honor for Rogers and a reflection of his hard work and accomplishments.

Students from various computational backgrounds such as physics, astrophysics, nuclear engineering, biology, and fluid mechanics participated in the workshop.

"The group of students were great," said Rogers. "A very friendly atmosphere was developed almost immediately."

During the workshop, Rogers was partnered with a student from the University of Illinois Urbana-Champaign and worked with LANL Research Scientist Dr. Jozsef Bokosi to add a complex geometry fluid flow solver to an existing C++CODE. The solver had to be written to utilize massive parallelization, as the target systems are the largest sized supercomputers.

He hopes some the work done at the workshop will help with the push towards Exascale computing.

Rogers was given the opportunity to continue working with his mentor and has a chance of publishing a paper once more progress on his research has been made.

"The workshop was a great experience and I would recommend the workshop to anyone interested in computational physics research," said Rogers.

Rogers is a 2015 Chancellor's Fellow and is majoring in aerospace engineering under the direction of his advisor Kivanc Ekici.

By Kathy Williams



Brandon Rogers

Dobbs Receives "Peach of an Athlete" Award

On March 29, 2016, MABE senior and Vols quarterback Joshua Dobbs received the Amateur Peach of an Athlete Role Model Award at the thirty-second annual Peach of an Athlete Role Model Banquet at the College Hall of Fame in Atlanta. The event honors amateur and professional athletes who exemplify good character and athletic achievement. Other honorees included former professional basketball player, Dikembe Mutombo and executive vice president of the Atlanta Braves, Mike Plant.



Joshua Dobbs

MABE Students Admitted into Engineering Honors Program

A total of eighteen engineering students were admitted into the Engineering Honors Program this semester. Six of those students are in the MABE department.

According to the Engineering Honors Program website, the purpose of the program is to provide greater intellectual challenges and broader educational experiences for undergraduate students. The benefits of the program include priority advising and course registration, automatic qualification to register in the first-year engineering honors course sequence, and the ability to register for smaller honors courses.

The MABE students admitted to the program are:

Evalynn Borrego
Sophomore
Biomedical Engineering

Adam Daniel
Sophomore
Mechanical Engineering

Andrew Ten Eyck
Sophomore
Biomedical Engineering

Not pictured

Benjamin Kinga
Sophomore
Mechanical Engineering

Matthew McVey
Sophomore
Aerospace Engineering

Katherine Stiles
Junior
Biomedical Engineering



Evalynn Borrego



Adam Daniel



Andrew Ten Eyck

By Kathy Williams

Orekhov Awarded NSF Graduate Research Fellowship



Andrew Orekhov

Andrew Orekhov was awarded a National Science Foundation (NSF) Graduate Research Fellowship last spring during his senior year in MABE and is using the fellowship to fund his graduate studies at Vanderbilt University.

The fellowship provides Orekhov with a three-year annual stipend of \$34,000 and a \$12,000 cost-of-education allowance for tuition and fees, and opportunities for international research and professional development.

While a student in MABE, Orekhov worked with Assistant Professor Caleb Rucker.

"It's really an honor to receive this fellowship and it was only made possible because of the undergraduate research opportunities that I've had at the University of Tennessee," said Orekhov. "I'm especially grateful for the mentorship of Dr. Rucker, who guided me through my research on robotic devices for minimally invasive surgery. Through the REACH Lab, I found a field that I'm excited about pursuing further and experienced first-hand the value of making meaningful contributions to engineering research."

While at Vanderbilt, Orekhov is researching control techniques for flexible robotic systems in surgical applications.

Fredebeil Receives Legacy of Excellence Scholarship



William Fredebeil

William Fredebeil is the recipient of the 2016-2017 \$10,000 Legacy of Excellence Scholarship awarded through the Society for Maintenance & Reliability Professionals Scholarship Program.

The Legacy of Excellence Scholarship is awarded annually to a student involved in programs that can lead to careers in maintenance, reliability and physical asset management.

Fredebeil is a senior Chancellor's Honors student and is pursuing a degree in honors mechanical engineering with a minor in reliability and maintainability engineering and business administration.

"I am honored to be chosen as the recipient of the Legacy of Excellence Scholarship," said Fredebeil. "As a student I have greatly enjoyed my classes pertaining to reliability and maintainability in the engineering field. This scholarship has allowed me to further my academic endeavors in the classroom and I hope to apply what I have learned to my future job in the workforce following graduation."

Originally from Signal Mountain, TN, Fredebeil is embracing college life and is taking advantage of all the

opportunities available at the University of Tennessee. He is heavily involved in extracurricular activities on campus. Currently, he serves as the President of Phi Gamma Delta, which has taught him a lot about leadership and management. He also serves as an Ambassador for the College of Engineering, President of Mortar Board, and Community Service Chair for Tau Beta Pi.

In addition to schoolwork and campus activities, Fredebeil has participated in the university's cooperative education program. This past summer, he finished an internship with ExxonMobil. He has also worked as a co-op student for BMW Manufacturing Company and as intern for WestRock. "Through these experiences, I have gained invaluable knowledge that I will be able to carry into my professional career," said Fredebeil.

Fredebeil is graduating in the spring of 2017 and is exploring an opportunity to attend graduate school and earn a master's degree in innovation management and entrepreneurship. He believes the master's degree will complement his career path and provide him the opportunity to enhance his analytical skills, which he can apply in an entrepreneurship or corporation in the future.

By Kathy Williams

Weisenberg Named ASME Fluids Engineering Division Graduate Scholar of the Year



Sofy Weisenberg

Sofy Weisenberg, who recently received her master's degree in biomedical engineering from MABE, has been named ASME Fluids Engineering Division Graduate Scholar of the Year.

Weisenberg was selected for the award based on the peer review of her technical paper, "Optimization of Ventricular Catheter Design Using High-Performance Computing."

In addition to the award, Weisenberg will receive a \$1,500 scholarship and the opportunity to join one of the division's

six technical committees in an area closest to her submitted work for one year.

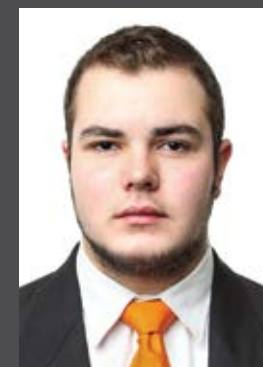
Assistant Professor and Weisenberg's advisor, Stephanie TerMaath, stated, "Sofy's graduate work will have substantial implications for hydrocephalus patients by reducing the need for continual shunt replacements via brain surgery and I have no doubt she will continue to make revolutionary contributions throughout her career."

"This is a unique and humbling opportunity to share my research and I would like to thank Dr. TerMaath and the MABE department for supporting this research in biomedical engineering," said Weisenberg.

Weisenberg received the award at the ASME Fluids Engineering Division Summer Meeting in Washington, D.C. on July 13.

By Kathy Williams

MABE Student Athletes 2016-2017



Aaron Adams
Football
ME



Kathryn Culhane
Soccer
ME



James Dagley
Swimming & Diving
ME



Joshua Dobbs
Football
AE



Darryl Harris
Track & Field
AE



Nicholas Hassler
Track & Field
ME



Andre Hillsman
Track & Field
ME



Adam Johnston
Track & Field
ME



Brittany Lindl
Tennis
ME



Jenna McGrath
Rowing
BME



Dartanian Oakley
Track & Field
BME



Timothy Rabb
Swimming & Diving
ME



Redmond Walsh
Baseball
AE



Micheala Williams
Soccer
ME

Joshua Dobbs Begins His Final Year of College and Football

By Kathy Williams



This fall, Joshua Dobbs, who's an aerospace engineering student and the University of Tennessee's star quarterback, started his final year of college and football.

Dobbs took some time out of his busy schedule to give an update on his classes, football, life, and his future.

Q: How do you feel about starting your last year of football and classes?

I am very excited to be in my final year of college and football. It's crazy how fast time truly does fly. It feels like I just left Alpharetta High School.

Over my three years here at UT, it has been very rewarding to see the development, the progress, and the growth of our football program. When my teammates and I committed to the university, we all pledged that we were going to get Tennessee football back to where it should be. Picking up from our momentum at the end of the 2015 season, we are confident that we will do so.

I am so grateful for all of the opportunities I've had up until this point; yet, there is so much more that I hope to accomplish during my last year, both academically and athletically.

Q: What are your hopes and expectations for this football season and classes?

In the classroom, my expectations are to continue to excel and finish strong. It is an exciting semester for me because I am taking very specific aerospace engineering classes and will start my senior design project. My more technical classes include aerodynamic, astronautics, and propulsion, which involve core principles that I used firsthand during my two Pratt and Whitney internships over the last two summers.

On the football field, my goal is to pick up where we left off last season. We ended the year on a six game winning streak and are projected to do really well in the SEC. As a team, we are taking each game one week at a time; but, we expect to win each time we get on the field. So, my goal has been to stay focused in my preparation and to provide inspired leadership for the team.

Q: How have you grown as a person (mentally, physically, and spiritually) over the past 3 years?

I feel that over the past three years I have really grown in all aspects of my life—mentally, physically, and spiritually. Coming out of high school, I considered myself to be a pretty good multi-tasker, was always hyper-focused, and had set very specific personal goals. So, even though I had been preparing for and expected to face challenges once I got to college, I quickly found out that nothing could really adequately prepare me for the transition, and how demanding it is to juggle the academic workload and play football in college. I had to rely heavily on my faith, and am so grateful my parents equipped me with a sound spiritual foundation. No matter how hectic my schedule becomes or how difficult a situation gets, I can find peace and encouragement in my faith.

Another area of growth that has been really beneficial has been me understanding the value of surrounding myself with like-minded people, and having great roommates, teammates, and friends, who have similar goals and

aspirations as I do. We support and challenge each other to stay focused on our goals and to make good choices.

I have also been blessed to build relationships with some great mentors. I can drop by their offices or call them to talk, ask questions, or get advice. People like our VFL Coordinator Antone Davis; Assistant Athletics Director for Student-Athlete Relations and Letterman and UT legend Condredge Holloway; future hall of famer Peyton Manning; and MABE Department Head Matthew Mench. They have all been great sources of encouragement and balance for me.

Physically, with the help of our strength and conditioning staff, trainers, and nutritionists, I've added good muscle bulk each year. I've learned how to take better care of my body, knowing which drills are the most helpful, and making good choices about how I rest and what I eat.

Q: Last year you flirted with playing baseball in the spring. Are there any plans to play baseball this spring?

Yes, I did workout with the baseball team and strongly considered playing last spring. However, when I sat down with head baseball Coach Dave Serrano to evaluate my academic load, the spring football camp schedule, the baseball schedule, as well as, conflicts during the month of May with my internship, we agreed that it was going to be too difficult to pull it off. Since I committed to Tennessee in high school, Coach Serrano has graciously kept the door open for me to come out for the baseball team. I am extremely appreciative to have that opportunity, and Coach Jones' support as well. With everything that is going on this fall, I have not had time to think about baseball for the upcoming season. Once our football season ends, I'll re-evaluate the situation and meet Coach Serrano to discuss options.

Q: Do you ever think about the possibility of coaching at all in the future?

Over the years, I have served as a college counselor at several football/quarterback camps. Last summer, I volunteered at the QB Summit in Dana Point, CA, the Elite 11 Finals in Beaverton, OR, and the Manning Passing Academy in Thibodeaux, LA. I also worked at multiple UT football camps held on campus. I really enjoy working with young players because it not only gives me an opportunity to teach and mentor others, but it also allows me to continue to work on my own skills as well. Teaching and communicating technique to young players force you to self-assess and make sure you are also using the correct techniques that you are trying to teach. I can definitely see how rewarding coaching others can be. I would never say never, but right now I don't see myself coaching as a profession because of my long term goals in aerospace engineering.

Q: Tell us about your latest internship experience in Canada.

Over the summer, I had a great opportunity to travel and immerse myself into a foreign city and its culture while working and learning at the world's leading engine manufacturer, Pratt and Whitney, Canada in Montréal, Quebec.

I was assigned to the development department. My projects and responsibilities involved collaborating with sectional engineers within the department to observe and evaluate the coordination of their engine

development process. I spent several days rotating to several test stands, learning about various P&W engines (PT6, PW800, APS5000), and understanding the testing process of development engines; worked in the strain gauge and instrumentation labs to understand how different components of their engines are fitted with instrumentation devices; assisted in the tear down and build of PW100 series engines to evaluate the durability of the engine after accumulating intense run time; and was involved in rig tests, in which the efficiency of single components of the engines were tested.

While the most difficult challenge to overcome during the assignment was getting acclimated to the difference in languages used within the facility, it was the primary reason I wanted this internship. French is the official language of the Canadian Province of Québec. Fortunately, Montréal is one of the most bilingual cities in the province. Although I learned extensive Parisian French in high school, and most of the Montréalians spoke both French and English, it was sometimes difficult to communicate on a technical level with some of the test operators and build engineers. While both Metropolitan (Standard Parisian/European) and Québec (Canadian) French are rooted in early modern Classical French, the two are completely distinct versions of French. So, it really took patience and constant back and forth dialogue in both French and English to overcome this challenge and to understand each other.

I am eternally grateful to Pratt and Whitney's internship program and my mentors who gave me the opportunity for this assignment and to challenge myself.

Q: Do you have any idea what you'll be doing after graduation?

Once the football season ends, I will start pre-draft preparations for the NFL as I wrap up two final classes for my aerospace engineering degree in the spring semester. Based on the outcome of that process, I will weigh the opportunities to continue playing football, entering the aerospace engineering workforce at one of several companies, or possibly pursuing a post-graduate degree.

Q: You're a pretty "famous" person now. How does it feel to be recognized when you go out?

It is a very humbling experience to be recognized by so many people. I am amazed to see the influence I have and number of people I affect as the quarterback at the University of Tennessee.

As Coach Jones says "playing football for the University of Tennessee is a global position and you have to respect the power of the position." I have definitely experienced this for myself. There are very few places that I can go in Knoxville and not be recognized. Fans want to say hello, get a picture, and sometimes share stories about how I may have helped to encourage or inspire their children. I feel blessed because I have had the opportunity to meet so many people that I otherwise wouldn't have.

There have been times when I have been at the airport in Atlanta or another city and a fan will stop me to just shake my hand and wish the team success. In some cases, I'm left scratching my head at how they know me. Over the winter break, I flew to Texas to participate in a student summit. I arrived late, so it was dark outside when we left the airport. On the way to the hotel, we stopped at a drive-thru

restaurant to pick up a quick bite to eat. I was wearing a cap and was sitting in the back seat of the rental car with a Texas license plate. As we pulled up to the pick-up window and I let the window down to pay for the food, someone in the car behind us yelled, "Hey, are you Josh Dobbs?" I have no idea how they recognized me.

Even when I was out of the country I was surprised. Last summer, while on my Canadian internship, I decided to drive from Montreal to Quebec City one weekend to do a little sightseeing. I was walking down the street looking at a map trying to find a landmark. As I approached the corner, a car, from the United States with Virginia tags, pulled up with a man and a woman in it. The man leaned out the window and shouted, "Hey Josh! Go Vols!" I wasn't wearing any Tennessee gear. I didn't even have on anything orange. I was speechless. Like I said, it is very humbling because in those moments you understand the power of the position. You realize that in all of those encounters, you are not only representing yourself or your family, but you also represent your university and your team.

Q: You're a very busy person, but you always seem to find time to do things like write a letter to a kid who admires you or surprise a little boy who has cancer. Why is making time for these things important to you?

Being a part of the football team at the University of Tennessee gives me a unique platform to impact people in our Knoxville community and even nationally. I know that there are a lot of people facing challenges or needing a little encouragement. So, making time to write a letter or to surprise someone in the hospital is really important to me. I enjoy being a positive influence and finding ways to help others.

Q: Tell us how you met AJ Cucksey and what that relationship means to you?

I have a very special friendship with AJ Cucksey, a little boy in the Knoxville community who is battling brain cancer. AJ was diagnosed with a form of pediatric cancer called pilocytic astrocytoma that causes non-malignant tumors in the brain. He had multiple tumors located in difficult areas of his brain blocking the normal flow of cerebrospinal fluid and causing a buildup of fluid and pressure. AJ completed chemotherapy in December, 2015, however, the tumors are inoperable and he will possibly be affected by the condition for the rest of his life.

Our VFL Coordinator Antone Davis arranged for AJ and his dad to come by the Anderson Center to watch one of our practices in November, 2014. When I met him, I could immediately see he is a special kid. He was weak from his treatments and wheelchair bound, but he was smiling, singing, and so happy. Several weeks after his campus visit, I saw him on television doing an interview with one of the local stations. The reporter asked him who his favorite player was, and he said "Josh Dobbs." I think he may have mentioned UT legend Peyton Manning also, but all I heard was my name. It was so touching because I saw what a warrior he is.

UT Football sent him a large #14 jersey for the 2014 season with all of our signatures, after his visit at practice. I figured his parents would probably frame that one, so I started looking for a #11 jersey in his size. After searching for a few weeks, I finally found one that would fit a four-year-



old. I was able to take it to him and spend some time with him at his home. He and I have been buddies ever since.

His parents are doing an outstanding job supporting and encouraging him. They created a Facebook page, Prayers for AJ Cucksey, asking people to send encouraging notes and prayers for AJ's recovery.

I visited him last December, the day before we left for the 2015 TaxSlayer Bowl, to get two of the "Prayers for AJ Cucksey" bracelets that his parents created. I wore both of them during our bowl game victory against Iowa and gave him one of them when we got back to Knoxville. I try to spend as much time I can with him because he is such an inspiration. No matter how sick or tired AJ gets from the treatments and the battle, he has the courage to keep smiling and singing. All he asks is we keep praying for him.

Q: It's no secret that you have alopecia areata, but you have never really been asked about it or been given the opportunity to discuss the disease. I want to give you the opportunity to discuss it.

I was diagnosed with alopecia areata in elementary school when I noticed small patches of hair loss on my scalp. Alopecia areata is a type of hair loss that occurs when your immune system mistakenly attacks hair follicles, which is where hair growth begins. Unfortunately, no one knows exactly what triggers the immune system to attack the hair in this way.

After several visits to the dermatologist and topical treatments, we were able to get the symptoms under control and the hair grew back. For the most part, it remained dormant until I entered high school, but it is highly unpredictable and cyclic. Hair can grow back in or fall out again at any time. Eventually, I started to lose hair in my eyebrows and scalp again. Then, over the last few years, the hair loss progressed, so I decided to just shave my head.

Fortunately, alopecia does not affect you as another condition might. It isn't painful, doesn't make you feel sick, and doesn't result in serious health problems. On the

other hand, your hair is a major part of your self-identity. So, certainly when you lose your hair, your self-image can be drastically altered. People have lots of questions, they stare, and they make comments when they see something out of the norm. I often have to explain the condition and clear up rumors.

When you're in the media and often seen on camera, you're prone to have more people discussing it, both positively and negatively. Sadly, there are a lot of keyboard bullies out there on social media who feel they can make offensive comments and jokes, while cowardly hiding behind the anonymity of their computer screens. Seeing "media personalities," who are supposed to be professional, posting negative comments is probably the most disappointing.

Fortunately, the confidence my parents instilled in me and my strong Christian faith has helped me keep this small challenge in perspective. I've played competitive sports for so long. Needless to say, I learned early on that people can be critical of your performance and actions. I simply file criticism about my appearance into the same category. You see it and you get annoyed by it, but you don't let it affect you. That's what they want it to do. In their ignorance, they try to make you feel less about yourself at the expense of boosting their own ego or trying to make themselves feel better. In most cases, I just block out the negative.

I know that my identity and my worth as a human being are not based on whether I have hair or not. When I think about all of the people who struggle every day with debilitating or life-threatening diseases, for me losing a little hair falls pretty low on the totem pole. My lack of hair hasn't prevented me from doing a single thing I have wanted to or will do in life.

Ironically, the same platform, that puts me in the position to receive the negativity, also allows me to positively impact others who may be affected by alopecia or some other challenge. It is really humbling and personally rewarding to have an opportunity to encourage a little kid who may be scared or insecure.

Three New Members Added to MABE Hall of Fame

By David Goddard

In the spring, MABE added three new members to its Hall of Fame, including a former department head, a former high-ranking official of the Boeing Company, and the current chief operating officer of the Southern Company.

Joel Bailey, Howard Chambers, and Kimberly Greene, respectively, joined last year's inaugural class of four and were honored with an unveiling ceremony at the department's office in the Nathan W. Dougherty Engineering Building and presented with a Hall of Fame plaque replica during the MABE Honors Awards Banquet at The Foundry.

"This new class of inductees again sets a perfect example for our current students to follow and to understand what kind of career and life are possible with a degree from our department," said department head Matthew Mench. "Students walking by the wall with all of the class members will see the wide variety of paths available to them while at the same time learning some of the history of the department."

The 2016 class:



Joel Bailey

Joel F. Bailey

Bailey received mechanical engineering degrees from Purdue University and Lehigh University before joining UT's faculty in 1949.

He served as head of the department from 1952 to 1973.

In 1956, Bailey helped establish the graduate study program at the Arnold Engineering Development Center in Tullahoma, now known as the UT Space Institute, and served as its first director.

In 1967, Bailey was named an Alumni Distinguished Professor.

He was also instrumental in

the founding of the Pi Tau Sigma engineering honor society chapter at UT. The society's award to the senior in mechanical engineering with the highest average is named in his honor.

During his career, he also held academic positions at Lehigh University, Oregon State College, and Northwestern University.



Howard Chambers

Howard E. Chambers

Howard Chambers graduated from UT with a bachelor's in mechanical engineering in 1964.

He served with the Boeing Company for many decades and played critical roles on some of their highest-profile projects before retiring in 2011.

While at Boeing, he was vice president and deputy program manager of the 787 program, vice president and general manager of space and intelligence systems for

Boeing's Integrated Defense Systems, chairman of the board of Boeing Satellite Systems International Inc., and chairman of the board and CEO of Boeing Satellite Systems Inc.

He also served as chairman of the board of Spectrolab Inc. and has received the 2002 Amelia Earhart Award for mentoring, the 2009 Nathan Dougherty Award for the College of Engineering, and the 2015 UT Alumni Service Award.

He also served on the College of Engineering Board of Advisors, where he is now an emeritus member.



Kimberly Greene

Kimberly S. Greene

Kimberly Greene earned her bachelor's degree in what was then known as engineering science and mechanics—now mechanical engineering—in 1988.

She went to work at Southern Company in 1991 and has enjoyed a successful career with the energy giant, including serving as vice president of finance and treasurer.

From 2007 to 2013, Greene worked for TVA, serving as chief financial officer, executive vice president of financial services, and chief risk officer before returning

to Southern Company as president and CEO of Southern Company Services.

Greene became chief operating officer and executive vice president of Southern Company in 2014. She was named to the list of "Top 25 Power Women to Watch" by Atlanta Woman magazine and named Power-Gen's 2015 Woman of the Year.

She serves on the advisory board for both the UT College of Engineering and the University of Alabama at Birmingham School of Engineering.

Greene is a member of the Alabama Engineering Hall of Fame and a recipient of the UT Distinguished Alumni Award.

Those three join the 2015 inductees—former Chancellor William Snyder, former astronaut Henry Hartsfield, former American Society of Mechanical Engineers president Richard Rosenberg, and longtime Chrysler Corporation fixture Rinehart Bright—in the hall.

To be considered for inclusion, inductees must have earned a degree from MABE department or an engineering degree from another accredited engineering school or college with a sustained positive relationship with the MABE Department; have had at least ten years of engineering and/or other professional experience since earning their engineering degree; and be recognized for their accomplishments and contributions to the profession and to society by membership in honorary societies and receipt or special honors and awards from recognized national and international academic and/or industrial organizations.

Alumni Updates



Nima Tamaddoni and Graham Taylor

T&T Scientific Awarded \$12,000 in Boyd Venture Challenge

T&T Scientific, a company founded by recent MABE doctoral graduates Nima Tamaddoni and Graham Taylor, was one of three startup companies to receive the spring 2016 Boyd Venture Challenge.

The company was awarded \$12,000 of the total \$35,000 awarded to the three companies.

T&T Scientific was started last year to help bioengineering, electrophysiology, biophysics, and molecular biology laboratories with research and a variety of needs that may arise.

Earlier this year, they launched the online sale of the LipX Extruder, the world's first single-use disposable liposome extruder. The device ensures cleanliness and sterility while saving users time and money.

T&T Scientific received \$20,000 in funding from the fall 2015 Boyd Venture Challenge, which they used to begin production of the device.

They plan to use their recent award to develop automated quality control, assembly lines, and a portion will be used for marketing.

The Boyd Venture Challenge is administered through the Anderson Center for Entrepreneurship and Innovation in UT's Haslam College of Business and is made possible by the generosity of Randy Boyd, Tennessee Commissioner of Economic and Community Development and founder of Radio Systems Corporation.



Graham Taylor and Nima Tamaddoni holding the LipX Extruder, the world's first single-use disposable liposome extruder.

Alumni Spotlight: Paul and Madeline Bunch

By Aldai Hurt



Imagine developing a passion for engineering early in life, then overcoming financial constraints to earn a mechanical engineering degree from UT that empowers a successful and

rewarding career where you are renown as an expert in your field. This is the journey of alumnus Paul Bunch (*BS, ME '72*). Paul, along with his wife, Madeline, now actively join UT on its journey to the Top 25 both monetarily and as engaged volunteers.

“My education has helped me in every aspect of my career,” states Paul as a testimonial to the quality and value of his UT degree. “I have always applied the knowledge I gained in my engineering education and it has provided a foundation for many years of learning and building on that knowledge. As an engineer, you never stop learning and I have been fortunate to continue applying and developing knowledge my entire career.”

In 2010, Paul retired from Cameron International as Director of Worldwide Technical Services. As an expert in the development of high pressure, high temperature (HPHT) equipment for the oil and gas industry, he then founded Bunch Technical Services, Inc., a consulting company that provides HPHT technical support for divisions of Cameron/Schlumberger and focuses on writing HPHT industry specifications for the American Petroleum Institute.

While Paul had long thought about providing support to UT, it was Madeline’s Houston-based philanthropic activities and Paul’s subsequent involvement that further inspired him. As Madeline then became familiar with UT and what it means to Paul, they discovered philanthropic opportunities to drive outcomes on campus that are meaningful to them and the college. As Paul says, “I know first-hand how much of a struggle it can be financially to complete a college degree and if Madeline and I can give that opportunity to students who might not otherwise be able to afford it, that would be of great satisfaction to both of us.”

The Bunches recently established the Paul and Madeline Bunch Fellowship, which provides student-aid for a graduate student pursuing a research topic related to fracture mechanics. Dr. Matthew Mench, Head of the Department of Mechanical, Aerospace and Biomedical Engineering, Condra Chair of Excellence Professor, and Joint Faculty at ORNL is grateful for this form of support. “The Paul and Madeline Bunch Fellowship empowers me and a faculty member to recruit and retain a graduate student that likely would not attend UT if not for the Bunch Fellowship. Graduate recruiting is a competitive national marketplace and fellowships drive our ability to recruit top-tier students who will assist in advancing UT’s research and thought leadership,

which is vital in our journey to become a Top 25 public research institution,” Mench said.

In addition to their fellowship, Paul and Madeline have documented their plan to establish the Paul and Madeline Bunch Endowed Scholarship through their estate. This deferred gift addresses the strategic fundraising priority of endowed undergraduate scholarships. Not only will their generosity provide a wonderful legacy at UT, but it will impact the lives of students as long and there is a UT.

In addition to their financial contributions, Paul and Madeline met a group of UT students in Belize this spring during an Alternative Spring Break service experience led by Judith Mallory, Engineering International Coordinator. Mallory led 15 students on the first joint project between the College of Engineering and the Chancellor’s Honors Program to the town of San Ignacio, Belize. It was there that the team completed building a root cellar for a future small dormitory with earth-filled bags—a project initiated in 2015 by another UT Engineering group—on a farm that will eventually serve as a home for girls who have aged out of the country’s foster system. Paul and Madeline, who were in Belize at the time, visited the worksite. They treated the UT student team to a picnic complete with homemade Belizean tamales, tropical fruit, roast chicken prepared by Paul, cupcakes bearing the Power T, and UT napkins. Paul even grabbed a pitchfork and a shovel on the project—fully embodying the Volunteer spirit!

Born in Chattanooga and raised in Red Bank, Tennessee, Paul grew up tinkering on motorcycles and cars, which came to dominate his childhood interests. His interest in engineering was also stoked by his uncle who worked for the Coca-Cola Bottling Company in Chattanooga. “He gave me a tour of the operations at a very early age,” Paul recalls fondly. “I was fascinated by the equipment and thought the engineers who designed that equipment must have one of the best jobs there is.”

Paul began his studies at UT Chattanooga before transferring to the Knoxville campus. He worked part-time while attending classes in order to support himself and pay for school. “UT was such a friendly environment with a lot of comradery among fellow students as well as the professors, which instilled a confidence in learning and getting a degree,” Paul recounts. “Even though it seemed difficult balancing work and study at the time, I always look back on it with great appreciation for what I learned and what I experienced while I was there.”

Upon graduation, Paul entered a tough job market, but enthusiastically accepted a position as Design Engineer and Structural Analyst with Pratt and Whitney Aircraft in West Palm Beach, Florida. After four years, he joined Cameron Iron Works in Houston, Texas, which later became Cameron International. “I was the first University of Tennessee graduate to be hired at Cameron,” recalls Paul. “The significance to that was, over time, the company management recognized the quality of engineer graduating from UT and began recruiting on campus. I reached a level of management where I could personally recruit engineers from UT. I think that is a good example to show the quality of engineers that graduate from UT and it validates the level of education provided by the professors and staff.”

Prior to retiring from Cameron International, Paul, as Director of Worldwide Technical Services, managed the

departments of Engineering Structural Analysis, Metallurgy, Welding Engineering, CAD Systems and Reliability Engineering. Since founding Bunch Technical Services, Inc., Paul’s focus has been on high pressure, high temperature (HPHT) equipment for the oil and gas industry. “I was part of the Cameron management team to develop the highest pressure drilling and production equipment in existence today,” he states. “I am currently focused on the development of material environmental testing programs for Cameron/Schlumberger in addition to providing HPHT technical support for Cameron/Schlumberger divisions of Surface, OneSubsea and Drilling Engineering departments.

Paul traveled the globe as part of his work related activities. And, enjoyed many years of running marathons when not working. While he has scaled back on both activities, he still enjoys running and spending time at his home in Belize where he is still active in fishing and diving as well as traveling the country. He also enjoys visiting his family in Chattanooga. Paul and Madeline are also true dog lovers, with seven dogs in total.

Paul recognized throughout his career the transformational impact of his UT Engineering education. Now, Paul and Madeline Bunch are serving as torchbearers in philanthropy through their support of the college.

Memories from a MABE Alum

By Larry Lacey

Larry Lacey (’63) wrote the following feature about Emeritus Professor Robert L. Maxwell.

In 1958, the College of Engineering decided to try a more theoretical engineering curriculum. Unfortunately, I was one of 100 engineering students selected from 2,400 incoming freshmen to take a three quarter course in theoretical physics. This replaced the first-year engineering problem-solving and how to read a slide rule.

Some of the professors thought we were getting too far from the practical aspects of engineering, especially Professor Maxwell. During the courses he taught, he would ask questions and tell stories to illustrate the practical aspects of engineering. One day, he asked the class if anyone knew the difference between an engineer, a scientist, and a physicist. No one answered. He said “a physicist takes all his data, squares it, takes the square root of it and guesses at the answer. The scientist cubes all of his data, takes the cube root of it and guesses at the answer. The engineer, hell, he just guesses at the answer.” Maxwell added, “a scientist will also take the data, accurate to at most 25%, plug it into a formula, raise it to the third and fourth power and carry out the final answer to six decimal places. Why have decimal places?”

Another story to illustrate his feelings that engineering was straying too far from practical applications was when he told how he put through a requisition for equipment he needed for an experiment. He wanted to purchase a milk bucket and a set of milk scales that cost \$26. The requisition was rejected. He noted that if the requisition included a volumetric container, accurate to a millionth of a gram, which would cost \$26,000, the requisition would have been approved.

The first class period of the last class in Machine Design started with Professor Maxwell walking to the blackboard and writing, “I have a 300 lb. car...STOP IT.” He then walked out of the classroom.

From previous classes, we knew that meant a set of brakes with working drawings. Most of the students designed a set of drum or disc brakes. One student designed a set of wedge brakes.

The last week of class was spent doing presentations of each student’s design. The last student to present his design was the student who designed the wedge brake. During the presentation, Professor Maxwell challenged the concept. He said it would not work. After some discussion, he asked the student to go to the chalkboard and show proof, but the student was unable to prove his concept. No one else volunteered. Professor Maxwell told us that during the final class, which was the following week, that every student was to bring the proper proof that the wedge concept would work or we would all fail the class and therefore would not be graduating.

The class got together to work on the proof, which showed the design concept was possible, depending on the angle of the wedge. I took our proof to our former Dynamics of Mechanics professor for him to check. He noted that the proof we came up with was correct.

Although we had come up with the proof on paper, we still had a problem. Professor Maxwell said it wouldn’t work and we had to prove it would. One of my classmates had access to a hot-rod shop, so he took an old washing machine motor with a flywheel, some wood, and brake material and built a simulator of the design.

On the last day of class, we demonstrated the design for Professor Maxwell. He stood there with a cup of coffee in hand, making no comments. He then went to the front of the class and gave a farewell speech. We all turned in our proof papers. He made no comments and no one asked any questions.

We all went to the mechanical engineering office the next day to find out our grades. Every student in the class received an “A.”

Some years later, I reflected back on that moment of the concept demonstration—Professor Maxwell with a cup of coffee in hand, making no comments. It must have been one of the most satisfying moments of his career. He was graduating a class of practical engineers.

Professor Maxwell made an ever-lasting impact on his students. He passed away on May 20, 2006 at the age of 86.

Attention Alumni! We Want Your Old Photos

The MABE department 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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