

MESSENGER

Tennessee Tech Department of Mechanical Engineering

The newsletter for alumni and friends of the Department of Mechanical Engineering | Fall 2020



A Note from the Chair

Dear Alumni and Friends:

I sincerely hope that this message finds you and your family safe and healthy. Please accept this e-newsletter as a small token of our appreciation for you at the end of an incredible year. It has been a while since I wrote to you, but I knew it was more important than ever to reach out. We find ourselves in an extraordinary time. This pandemic has changed our world, and it is attempting to bring humanity to its knees in profound ways. Just when we were recovering from the devastating tornado that hit Cookeville back in March, the COVID-19 crisis started.

The year 2020 will never be forgotten by any of us. When we celebrated holidays and happy times last year with family and friends, we did not expect that this year would be a very different story. It clearly shows how things can change in life, and we have been reminded not to take anything for granted. This year has certainly made me humbler and immensely grateful for everything that life has given me. On the flip side, however, as I recently watched the Space X rocket blast off into space with four astronauts to dock with the International Space Station, I saw this as a great testament to the resilience and hope for humanity! Humans have endured much more than this crisis in the past, having prevailed over many wars, natural calamities and pandemics over the course of history. I am confident we will rise from this one as well and be together again.

So, it is in that spirit that I am writing to let you know that this pandemic has not affected our efforts to deliver quality education to our students. In fact, we are more dedicated than ever to preparing our students to go out and find ways to make the world a safer, better place. Students left for spring break in March, and then all classes moved to online teaching for the rest of the spring semester. Some of our faculty who had never taught online classes quickly learned how to go virtual, and we ended the semester on a high note with very few issues. Everyone pitched in to help others navigate our new normal, and the students were generally surprised at how smoothly the classes were in the online environment.

Over the summer, most classes remained all online. Having successfully navigated the transition to online teaching, the

campus reopened with face-to-face instruction and a hybrid format in August for this fall semester. I must say this is one of the best decisions that our administration has made, and our students could not be happier. We are following all the health and safety protocols and so far, and we have had no major health issues. I am pleased to say that this pandemic has not halted student LEARNING one bit, including the invaluable hands-on learning that is the hallmark of our degree programs.

I am so impressed by and grateful for the extraordinary effort, resourcefulness, goodwill and grace demonstrated during this challenging time by our students, staff, faculty, administrators and by you, our dear alumni. We exist because of cherished alumni and partners in this mission. I am very grateful to you for all your support and kind wishes; and I hope and pray that together we will persevere and overcome whatever challenges we may face. This is a time unlike anything we have experienced before. It has been challenging, and it will continue to be challenging. No matter the challenge, this too shall pass; and with the good news of vaccines and better treatments coming soon, I see light at the end of this dark tunnel. We are all hoping for many good things in 2021!

We also want to share some of the good news since I last wrote to you, and many exciting things have happened in our mechanical engineering department. Despite the challenges this year, our enrollment has been steady at about 750 undergraduate and 70 graduate students. I invite you to explore the "ME Department News" section on our website and current posts on social media. In this newsletter, you will find updates on our educational efforts, research and new faculty hiring, as well as a combination of student and faculty accomplishments and alumni highlights. The mechanical engineering department wishes you a very safe and joyous holiday season and a happy new year!

Best Wishes,

Dr. Mohan Rao
Mechanical Engineering
Department Chair



New Faculty Faces

After intensive searches, the mechanical engineering department was pleased to announce the hiring of four new faculty members, two in fall 2019 and two more in fall 2020.



Dr. Mohammad Albakri joined the mechanical engineering department at Tennessee Tech in fall 2019 as an assistant professor. His research interests are in the areas of computational mechanics and structural dynamics with applications in structural health monitoring, advanced manufacturing and smart structures. He received his Ph.D. degree in engineering mechanics from Virginia Tech in 2016.



Dr. Rory Roberts joined mechanical engineering as an associate professor in fall 2020, and he earned his Ph.D. in mechanical engineering from the University of California – Irvine in 2005. The main focus areas for his research include aircraft thermal management, power systems for aerospace and space-based systems, fuel cells, electric propulsion, hypersonic power and thermal management, dynamic modeling of multidisciplinary systems and design and optimization of dynamic systems and controls.



Fall 2019 also saw the addition of **Dr. Will Brookshear** on a one-year instructor appointment, and he was hired full time in fall 2020. He earned his Ph.D. in mechanical engineering from the University of Tennessee - Knoxville in 2013, and his areas of expertise include thermodynamics, heat transfer and fluids. Dr. Brookshear is also assisting Dr. Dale Wilson as a faculty advisor for the Baja SAE team.



Dr. Arman Sargolzaei came on board as an assistant professor, and he received his Ph.D. in mechanical engineering from the University of Florida. Dr. Sargolzaei also holds a Ph.D. in electrical engineering from Florida International University. His research focus areas include wireless networks, wireless sensor networks, structure health monitoring, machine learning and its applications, eHealth and mHealth and assistive technologies.

For a full list of current faculty and their research interests, please visit: <https://www.tntech.edu/engineering/programs/me/faculty-staff.php#faculty>

Faculty Retirements

We were sad to see several of our respected professors retire in the last few years, but we are grateful for their service and wish them all the best. Dr. Jeffrey Marquis retired in summer 2015, and Drs. Sam Han and Glenn Johnson both left Tech in spring 2016. Dr. John Peddeson retired in spring 2017. More recently, Dr. Corinne Darvennes retired in summer 2019, followed by Dr. Meenakshi Sundaram in December 2019.



External Advisory Board News

One of the reasons the mechanical engineering department has been so successful is our external advisory board (EAB), whose members provide invaluable insight and input into our academic programs. We deeply appreciate the time and effort these alumni give to help us continue to build and improve. We'd like to take a moment to recognize a few of their recent successes and introduce you to our newest EAB members.

EAB Co-Chair Jon Callies was promoted from senior manager to vice president of the electrification systems division at DENSO in 2019.

Karen Ramsey-Idem was the recipient of a Society of Women Engineers' Advocating Women in Engineering Award in 2020. Karen is the global technical operations excellence and capacity planning leader for Cummins, Inc.

Esra Roan has been honored as one of the 25 Super Women in Business for 2020 by the Memphis Business Journal. Esra is the co-founder and CEO of SOMAVAC Medical Solutions, Inc., which developed a new surgical drain pump system so post-operative patients can recover faster and with less risk.

We were also very pleased to add two new faces and voices to the external advisory board in fall 2019. Mike Clemmer is the director/plant manager for the Paint & Plastics Division of Nissan North America. Robert Wiseman currently serves as the product manager for the commercial boiler division at Lochinvar, LLC.

For more information about the EAB, please click [here](https://www.tntech.edu/engineering/programs/me/eab.php).



Front row (L-R): Mohan Rao, Ph.D. (TTU), Arnold Lumsdaine, Ph.D., Keith Kirkpatrick, Ph.D., and Jon Callies. Middle row (L-R): Jie Cui, Ph.D. (TTU), Lito Mendoza, David Nesbitt, Navya Raghaji and Scott Bartlett. Back row (L-R): Robert Wiseman, Brad Long and Mike Clemmer.



New Engineering Building Makes Progress



An architectural rendering of the new engineering building at Tennessee Tech. The new project will include a body of water that will be used as an environmental classroom.

Talk about exciting things at Tennessee Tech! In fall 2020, Tennessee Tech unveiled preliminary designs for the new engineering building, and the current plan is to break ground on the location in Sherlock Park next summer. The 100,000-square-foot facility will be Tech's first new engineering building in 50 years.

Even though construction funding for the project was delayed as the State of Tennessee revised its 2020-2021 budget, Tech had received more than \$3 million from the state in a previous fiscal year to begin planning. The building, with an estimated \$57 million cost, remains the top priority for higher education construction projects, according to the Tennessee Higher Education Commission. Tech has also raised about \$8 million to support the building efforts.

The new facility will be a fusion of innovation with the historic style of campus buildings, featuring something for all of Tech's engineering disciplines to promote cross-disciplinary functions throughout the buildings. Along with the main building, there will be a student lab building for groups like Tech's championship Baja SAE team and the award-winning Formula SAE team, as well as a state-of-the-art autonomous electric vehicle platform and machine shops. The project will also feature a new water feature, dubbed Sherlock Lake, which will add to the visual appeal of campus and also serve as an outdoor classroom for students studying environmental engineering.

New Dean Leads Tech's College of Engineering

Change has also come to Tech's College of Engineering, as Dr. Joseph C. Slater became the new dean in July 2019. Slater came to Tech from Wright State University where he spent 26 years and served as an administrator for 8 years, most recently as the chair of the department of mechanical and materials engineering.

Dean Slater received his B.S. and M.S. degrees in aerospace engineering, and Ph.D. in mechanical engineering from the department of mechanical and aerospace engineering at the State University of New

York at Buffalo. He is a Fellow of ASME, Associate Fellow of AIAA, and a member Tau Beta Pi, Sigma Gamma Tau and Phi Eta Sigma. He is a member of the AIAA Structural Dynamics Technical Committee and a former member of the AIAA Gossamer Spacecraft Program Committee.

His research interests are dynamics, finite element modeling, control and model identification and validation. He has worked in the fields of UAV control, turbomachinery dynamics, fatigue, aeroelasticity, spacecraft dynamics and control and vibration damping. He and his wife, Diana, have three children ages 18, 16 and 11.





New Vehicle Engineering Concentration Excites Students and Employers

In fall 2019, students at Tech were offered an exciting new engineering curriculum option and the chance to prepare themselves for careers as leaders in the automotive industry, which is one of Tennessee's fastest growing fields. Vehicle engineering covers various types of vehicular systems such as traditional petroleum-powered vehicles, hybrid and electric vehicles, automated and connected vehicles and subsystems like engines, after-treatment systems, transmission, batteries, electric and control systems.

The vehicle engineering concentration at Tennessee Tech is the only such undergraduate program in the state, and it is designed to prepare engineers who know cutting-edge automotive technologies and are ready to develop innovative automotive products. The concentration is an interdisciplinary curriculum between mechanical engineering and electrical and computer engineering. Students in both majors will share common classes and senior capstone project courses, providing for a truly interdisciplinary education in this field.

Traditionally, mechanical engineering has dominated automotive engineering with emphasis on engines and combustion, emissions, design and manufacturing. The growth and diversification of the industry is expected to drive more change in the global automotive market in the next 10 years than during the previous 50 years. As the industry is transitioning toward more hybrid, electric and autonomous vehicles, there is now a

concentrated demand for automotive engineers with a background in areas like embedded hardware and software, sensors and electronic controls.

Tech is committed to producing a skilled automotive workforce for the state, which now has a significant automotive manufacturing presence, including Nissan, Volkswagen and General Motors, along with more than 900 automotive suppliers such as DENSO and Ficosa.



Innovative Electric Vehicle Research Helps Rural Areas

A unique research project that focuses on electric vehicles in rural communities in the Upper Cumberland is being conducted by Tennessee Tech and funded by the U.S. Department of Energy (DOE).

The DOE has approved \$779,823 for the project "Developing an EV Demonstration Testbed in the Upper Cumberland Region of Tennessee, an Economy Distressed Rural Region." The study, which is the first of its kind, is to develop a rural electric vehicle testbed to demonstrate and evaluate the applications of electric vehicles over a diverse range of activities serving a rural and largely economically distressed Upper Cumberland region. Previous research has been based solely on urban and suburban use of electric vehicles.

"We are one of the first to implement electric vehicles in a rural community," said Ping Chen, an assistant professor in Tech's mechanical engineering department. "When you look at rural areas, there are no charging stations. It prevents our rural communities from using electric vehicles. Our study will present a good example of how many charging stations are needed in rural areas, including the Upper Cumberland." Besides Tech, other research partners include the University of Texas at Austin, Nissan North America, Lightning Systems, East Tennessee Clean Fuels Coalition, Seven States Power Corporation, ChargePoint and the Upper Cumberland Human Resource Agency. The total budget of the project is \$1,559,686 with the DOE funding almost half and the rest coming from the project team. The research will consist of a small electric vehicle fleet including three Nissan Leafs, one plug-in light-duty truck and one battery electric transit bus along with an electric vehicle charging station network.

"This is a team project and the DOE is supporting us with a significant amount of money," said Chen. "We are going to use this money and the resources to develop complete charging stations and develop a charging station network open to the public."

The project objectives are to address the challenges of adopting electric vehicles into rural regions. The proposal integrates electric vehicle demonstration into the newly-formed vehicle engineering program at Tech. This newly integrated degree program educates engineers to use the latest technologies to design and manufacture modern vehicles, including electric ones.

The Upper Cumberland counties included in the research are Putnam, Cannon, Clay, Cumberland, DeKalb, Fentress, Jackson, Macon, Overton, Pickett, Smith, Warren, White and Van Buren.

"We try to give our rural communities this experience of using electric vehicles to understand the cost and usefulness of using electric vehicles," said Chen. "Very few are being used because there are almost no charging stations in the rural areas. The lack of charging stations is limiting the use of electric vehicles. It's the same situation in other rural areas in the United States."

The charging stations will be part of the first phase of the project, which runs through 2020. The second phase in 2021 and will include electric vehicle demonstration, data collection analysis, and information exchange, outreach and education activities. The project wraps up in 2022 with the deployment of five vehicles to different fleets, along with public meetings and forums with the public and private fleet partners, government agencies and the local communities.



Ray Sells' Support Improves Educational Experience for Students and Faculty

Harold Ray Sells ('57 mechanical engineering) made his first gift to Tennessee Tech in 1983 and since then, has become one of the department of mechanical engineering's most generous supporters. From scholarships to classroom renovations, his philanthropy has impacted generations of engineering majors and faculty.

"Ray Sells has been an amazing supporter of the mechanical engineering department for many, many years," said Mohan Rao, chair of the department of mechanical engineering. "Ray's generosity and dedication to giving back to his beloved department are part of his DNA and spirit. I can't even express all the emotions I have about the enormous impact his gifts have made on our students, our faculty and our entire department. Ray is indeed a treasure to us all and a model alumnus. His passion to help the department meet its main goal—to see students succeed—is appreciated beyond words."

Sells says he majored in mechanical engineering because he always liked to design, build and solve mechanical problems. His father was a highly-skilled automobile mechanic, and Sells believes he inherited some of his father's aptitude for engineering.

"My dad encouraged and supported my study of mechanical engineering," said Sells. "He only had about a fourth-grade education and wanted better for me."

After graduating from Tech in 1957, Sells began his career as an engineer with a small defense electronics company outside Washington, D.C. He later worked for the U.S. Corp of Engineers R & D Lab in Fort Belvoir, Virginia, before moving to NASA Marshall Space Flight Center in Huntsville, Alabama. Sells retired from NASA after a 34-year career working with the space program. His work focused on the pioneering ventures of the 1960s, including the Saturn Apollo Space Program, Skylab Program and Space Shuttle Spacelab missions.

"I came to Marshall shortly after it was formed to put men on the moon and safely return them to Earth," said Sells. "This was a dream career for those of us involved. Being a part of this team to make this roundtrip to the moon successfully happen many times—doing things that had never been done before—was tremendous. Working with skilled scientists and engineers was a rare and priceless opportunity. Watching that big rocket lift off for the moon was a very exciting thing."

In 2008, Sells and his late wife Doris established the Ray and Doris Sells Family Mechanical Engineering Program Development Endowment to support the mechanical

engineering department. This endowment is unique because 100 percent of the funds are used at the department chair's discretion.

"I designate my gifts to mechanical engineering as a challenge to those in other majors to support their departments and maybe bring in more and new support," said Sells. "I'm impressed with what the leadership and students in the department are doing and can see my gifts are helping. It's in very good hands."

In 2016, in appreciation for the Sells' generosity and belief in lifelong learning, mechanical engineering named a newly-renovated, high-tech classroom in Brown Hall in their honor. The Ray and Doris Sells Multimedia Classroom will have a lasting impact on the faculty and students who are fortunate enough to utilize the space.

"I'm always thankful that Doris was still here when Dr. Rao and Tiff Rector [executive director of planned giving] visited us and told us about naming the classroom," said Sells. "I guess both of us were left a little speechless. We never expected anything like this could happen. Those involved in the classroom design and renovation did an outstanding job. I still read the thank you cards from the students and staff who use the classroom."

Through his philanthropy, Sells says he hopes to enhance the quality of training mechanical engineering students receive, provide better classrooms and equipment, assist faculty and set an example for others.

"Even ordinary people like myself can help," he said. "I like to think I'm not only 'giving back' but 'paying forward.'"

Ray Sells is indeed paying it forward, and we are deeply grateful for his generous support, including graciously donating the funds to produce this newsletter promoting his beloved alma mater.





Tragedy Strikes and Tech Responds

Tennessee Tech loves Cookeville, and the Golden Eagle community showed just how much when a devastating F-4 tornado ripped through the western and northwestern section of Putman County on Tuesday, March 3, 2020. Although Tennessee Tech amazingly did not have any injuries reported or structural damage to any buildings on campus, President Phil Oldham canceled classes and closed campus on that Tuesday.

He urged the Tech community to show its love for Cookeville and Putnam County by canceling classes and closing campus again and designating Wednesday a Tech Loves Cookeville day of service for those willing and able to volunteer and help the victims.

Tech took that day of service call to heart, and hundreds and hundreds of students, along with many faculty and staff, volunteered to help with cleanup and recovery efforts

that Wednesday. They used chainsaws to cut trees, moved debris, carried supplies and cared for the people affected by devastating loss. Everyone's thoughts were focused on doing what they could for the survivors, and remembering the 18 lives lost that night. A 19th victim would succumb to injuries later.

Community officials were stunned at the number of people who came together at the meeting location. They asked for volunteers to stay away from the heavily damaged area on Thursday, prompting Dr. Oldham and university officials to resume classes and activities on campus. Later, local officials held a ceremony on Centennial Plaza to thank the Tennessee Tech University community for the love and support they showed Cookeville in those difficult days, weeks and months that followed. Recovery efforts in our community continue to this day.

Those We Have Lost

In addition to the tremendous losses from the tornado and pandemic, 2020 has also brought the loss of three very important figures in mechanical engineering's history.

On March 29, we lost former faculty member, Dr. J. Richard Houghton, who had retired in 1999. He mentored and advised a generation of students, including one of our current mechanical engineering faculty members, Dr. Sally Pardue.

Sadly, just one day after Dr. Houghton left us, Mrs. Virginia Lee Brown, wife of the late James Seay Brown, Sr., for whom Brown Hall is named, passed away at 101 years old. The legacy of the Browns is deep and lasting, not

only in our building's name, but also in the James Seay Brown Mechanical Engineering Scholarship, the Brown-Henderson Outstanding Faculty Endowment and the Prescott/Brown Lecture Series.

Then on August 19, we learned of the passing of Dr. Leighton E. Sissom, who had served as a professor, department chairperson, and college of engineering dean. Tech honored Dr. Sissom as an Engineer of Distinction in 2011, and he will always be remembered for his love for and dedication to Tennessee Tech.

Mechanical Engineering Students Continue to Make a Difference for Children in Need

It's one thing to complete a school project for a grade. It's something totally different to complete a school project that can change a person's life.

A group of engineering students at Tennessee Tech did both during a recent class project. Megan Wesemann, Stephen De Troye, Shelby Kilgore, Dayro Martinez and Christopher Gray created a custom-made hybrid spinal support to help a little girl with cerebral palsy. The project was part of the Early Intervention and Mechanical Engineering (EIME) program which pairs engineering students from Dr. Steve Canfield's ME 3610 - Dynamics of Machinery with families with children with special needs in the Upper Cumberland region to design assistive devices to help with feeding, mobility, play and other normal developmental activities.

"This project is an exemplary, but not unusual, demonstration of the skills and capabilities of our TTU engineering students," said mechanical engineering professor Stephen Canfield. "There were 17 similar projects in the EIME program this past semester alone by our mechanical engineering students to help children and families in our Upper Cumberland region. These students bring creativity, skill, energy and caring to help these families. These projects provide assistive solutions for special children and families that simply would not be available otherwise. These projects are very important to the development and growth of these children."

This particular project that Wesemann, De Troye, Kilgore, Martinez and Gray worked on was for a little girl named Miracle, who was born 15 weeks premature with brain bleeds and CP. Because Miracle has little mobility or trunk support, the family was having a hard time feeding and bathing her.

"We sat down and the students asked what they could do to help our



family," said Miracle's mother, Ashley Steakley. "We were anxious and super appreciative of what we were going to get done."

The team began their project at the beginning of the fall 2019 semester and quickly developed numerous potential designs. They created a custom-made hybrid spinal support with more rigid spine support and custom-molded torso support. Their design incorporated this hybrid spinal support system into a mobile base to help Miracle learn to walk. The team consulted with several orthopedic surgeons and performed detailed engineering analysis prior to fabrication and testing.

"The students find great reward in helping the families on the projects," said Canfield. "I can see it in the amount of time they spend on the project and attention to detail in fabricating and delivering the results. This is true for all my students, even the ones who are not the best test takers, or maybe are not the most punctual on homework, put in way more effort on the project. They clearly are motivated to help others."

When the project was complete, the students drove more than an hour to Miracle's home to deliver their creation one day prior to her first birthday. After spending almost two hours of tweaking and adjustments, the

orthopedic spine fit Miracle perfectly and the results were exactly what everyone had hoped for.

"We couldn't be happier," said Steakley. "Watching her little face as she has learned to move herself and sit up independently, it's truly better than we could have ever expected."

Once Miracle was comfortable with the orthopedic spine, she was placed in a gait trainer that allowed her feet to touch the ground and move around independently.

"She seems to like it a lot and it holds her in place. It worked out really great," said De Troye, a junior mechanical engineering major from Johnson City. "This is something that the family is going to get to use for years and actually impacts a child's life."

The experience not only touched Miracle and her family, but the students as well.

"I am so appreciative. It is astounding and life-changing to see how this affects her life," said Wesemann, a junior mechanical engineering major from Morristown. "This is what I want to do for my life. I want to design different products for people with disabilities and help them for the best."

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Mechanical Engineering Students (cont.)

"My mom is in the medical field, so helping people is something I've always wanted to do," echoed Kilgore, a senior mechanical engineering major from Dunlap. "It's cool to see it going from the designer style of it and then actually seeing it help a kid is crazy. I like it a lot."

Students involved in the EIME program often report to Canfield that the project is the most important part of their semester despite all the work that it requires. Many students identify the project as a key to their selection or continuing engineering and helps direct their career choices.

"I always thought we would build a robot that would move a ball or something like that," said Kilgore. "To see it actually help a kid's life versus just a project to just make something is really neat."

Student Spotlight



First-generation mechanical engineering student **Leanne Turpin** is a rising senior from Decherd, Tennessee. In addition to her active role in ASME, Turpin also won an Engineering, Computing and Technology Spectrum Award in 2019. The Spectrum Awards recognize a diverse body of students across all the degree-granting departments in the college of engineering for their initiatives and achievements in educational (projects related to course work), research (projects relevant to their discipline) and professional development activities (internship, co-op, or summer job). Turpin's love of Tech is what led her to come here, as she said, "I fell in love with Tennessee Tech when I attended a STEM camp as a 6th grader. I am living out my dream of being a Golden Eagle, and this experience has already surpassed all of my expectations. My favorite part of the program so far is getting the opportunity to work in the mechanical engineering workshop because of all the hands-on machining and fabricating skills I'm developing."

Alumni Spotlight



Dr. Rao and Richard Carlton enjoyed a good laugh during a visit to Brown Hall.

Mechanical Engineering alumnus **Richard Carlton** (1975, 1977) is certainly True 2 Tech, having given back to the university for 35 years. After graduating, Carlton enjoyed a very successful career in Silicon Valley, first in the solar energy field, and then as the owner and president of Carlton Engineering. Now that he's retired, he is looking forward to having more time to engage with the university that shaped so much of his life and career. According to Carlton, "The hands-on learning experience I gained at Tennessee Tech, along with the nurturing environment and small class sizes, prepared me to take on Silicon Valley and succeed. The faculty at Tech were like coaches, teaching us not only the technical skills we needed, but the practical and pragmatic skills which are just as crucial, that led me to the top of my field. Tech felt like home, and I will always be grateful I choose to go there."

Senior Design Projects Tackle Medical Issues

Many mechanical engineering students may not initially think of the medical device field as a career opportunity, but some recent senior design capstone projects are helping to change that. In both spring and fall 2020, several of the projects that teams tackled involved medical-related designs. Some students worked on ways to mechanically simulate edema, a condition where fluids build up under skin and other tissues. Typically, edema training requires applying gentle pressure to the patient's skin. Our students were seeking to mimic what the excess fluid would feel like under skin to help healthcare professionals learn to assess and diagnose this condition without always requiring a

human patient be present. Another project explored ways to improve IV poles, to make them just as stable, but less of a trip hazard for patients and medical staff. Other projects included a mechanism to help simulate skin-to-skin contact between very premature infants and their mothers. The design simulates the feeling of contact through heating a specific material to a designated temperature, playing the sound of the mother's heartbeat, and gently lifting and lowering to simulate the mother's breathing as she holds the child. Innovations in healthcare benefit us all, and we hope these projects, and future projects like these, help inspire our students.



Catching Up with Baja SAE

Baja teams from all around the world converged on Tennessee Tech for the Society of Automotive Engineers International at Tech's Hyder-Burks Agricultural Pavilion in April 2019. The almost 100 teams came from all over the United States, India, Mexico, Egypt, Canada and beyond for this intercollegiate design competition run by the Society of Automotive Engineers (SAE). This was the eighth time Tech has hosted the event, most recently in 2016.

"It was really exciting to have these schools from all over the world come to Tennessee Tech and be on campus," said mechanical engineer professor Dale Wilson, who is one of two faculty advisors for Tech's Baja team.

The Baja competition consisted of students designing and building small off-road cars with engines of the same specifications. The cars were put through a series of tests, including an endurance race which includes harsh elements and rough terrain.

"The design process is a great hands-on experience for the students to go through," said Wilson. "When they get to the competition, they not only race, there is a sales presentation, a design presentation and a technical inspection. It's a very rigorous process and a great way for students to put their engineering skills to the test, literally." Although the 2020 team had the Baja car ready, COVID-19 forced the cancellation of all in-person racing events this past spring. The presentation portions of the competition



were held virtually. Additionally, new mechanical engineering faculty member Will Brookshear joined Wilson as the Baja team's second faculty advisor this year, as Wilson prepares to retire in 2021.

SAE is currently reviewing plans for a modified version of in-person competition for 2021, and then Tennessee Tech University is slated to host a competition event again in spring 2022.

Tech Ties Lead to Lasting Legacies

Two families decided to honor departed loved ones by establishing scholarships in their memories in 2019; and mechanical engineering wishes to honor both the families' generosity and the legacy they are leaving for future students.

The Phillip D. Grissom Memorial Scholarship

Phillip D. Grissom was born November 11, 1959, in McMinnville, Tennessee. Grissom met his wife, Ruth ('82 Home Economics), on the steps of Murphy Hall during her first semester, and they were married on graduation day. He received his bachelor of science in mechanical engineering in 1982 and his master's in nuclear engineering from Georgia Tech in 1986.

He began his engineering career with Southern Company Services (later, Southern Nuclear Company, or SNC) in 1982 in Birmingham, Alabama, and worked for SNC until his retirement in early 2019. Grissom and his wife raised three daughters, Kelsey, Lindsey ('17 Mechanical Engineering), and Macy ('20 Mechanical Engineering). They have a long line of family members who have also attended the university.

Grissom was a brilliant engineer who loved his work. Due to his role with SNC, he established residency in Birmingham, where he and his wife built a life together. Grissom was a faithful and glad servant to his Birmingham church families at Asbury UMC, Vestavia UMC and Canterbury

UMC. He was also a kind and loving grandfather to his three grandsons, Keller Tibbetts, Houston Johnson and Morgan Tibbetts, and he loved living close to them.

When two of the Grissom daughters, Lindsey and Macy, decided to study engineering, they both wanted to continue the family tradition of studying at Tennessee Tech. However, the Grissoms' work and life in Alabama meant that the girls would accrue out-of-state tuition fees at Tech. Those fees seemed discordant with the family's loyalty to Tennessee Tech and their sense that Tech was "home." Fortunately, the girls' fees were eased by scholarships given by generous alumni. After Macy spoke at a 2018 scholarship banquet about her

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Tech Ties Lead to Lasting Legacies (cont.)

gratitude for the relief the scholarships provided, Grissom remarked that he would also like to provide such a scholarship one day.

Grissom passed away too soon on August 20, 2019, due to brain cancer. His wife Ruth and the Grissom family wanted to establish this scholarship in honor of him and to support future Tennessee Tech engineers, especially those who live out-of-state yet still want to make Tech their academic home. Because of Grissom's support for women in all fields, including engineering, the scholarship gives preference to female engineering students.

Vireshwar Sahai Scholarship Endowment for Engineering and Mathematics

Dr. Vireshwar Sahai came to the United States after being awarded a scholarship to study engineering at Oregon State University. After completing his undergraduate degree, he earned an M.S. and Ph.D. in engineering science and mechanics at Virginia Polytechnic Institute and State University. Sahai began teaching at Tennessee Tech for the college of engineering in 1966. His successful career spanned 32 years when he retired in 1998.

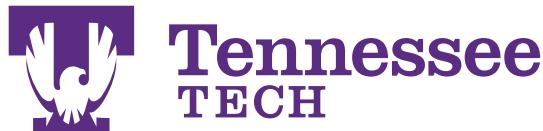
Professor Sahai passed away in January 2018. During his tenure as a professor, he worked tirelessly to help students at the University achieve their degrees. Given that he always considered himself an engineer with a mathematical emphasis, it is the hope of his widow, Krishna, and their children that this scholarship in those fields will continue Sahai's legacy by helping future bright-minded students obtain their educational goals in life

Mechanical Engineering Welcomes New Outreach Coordinator

When former Mechanical Engineering Outreach Coordinator Sonja Higgenbotham accepted a position in Tech's Center for Career Development at the end of 2018, the department initiated a search to fill the vacancy. In June 2019, Beth Smith came on board as the new coordinator after leaving the College of Graduate Studies just across campus. Smith is a native of Cookeville who holds a B.A. and an M.A. in English from Tennessee Tech. After arriving in Brown Hall, she's been busily adapting to the new role and responsibilities, giving the mechanical engineering website and marketing materials an update, working on the department's current ABET review process, assisting student organizations, coordinating and recreating other

events, working on this newsletter, among other things, and enjoying every minute of it.

"I am so grateful for the opportunity Dr. Rao and the department gave me last year, and I was amazed at how welcoming the faculty, staff and students were to in those first few days and weeks," said Smith. "This role has involved quite the learning curve, but it's beyond rewarding to get to work with the mechanical engineering team and students every day. Their hard work and dedication inspire me to want to do even more to spread the good news about our department. I am in awe of the research and projects envisioned and created in this department."



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