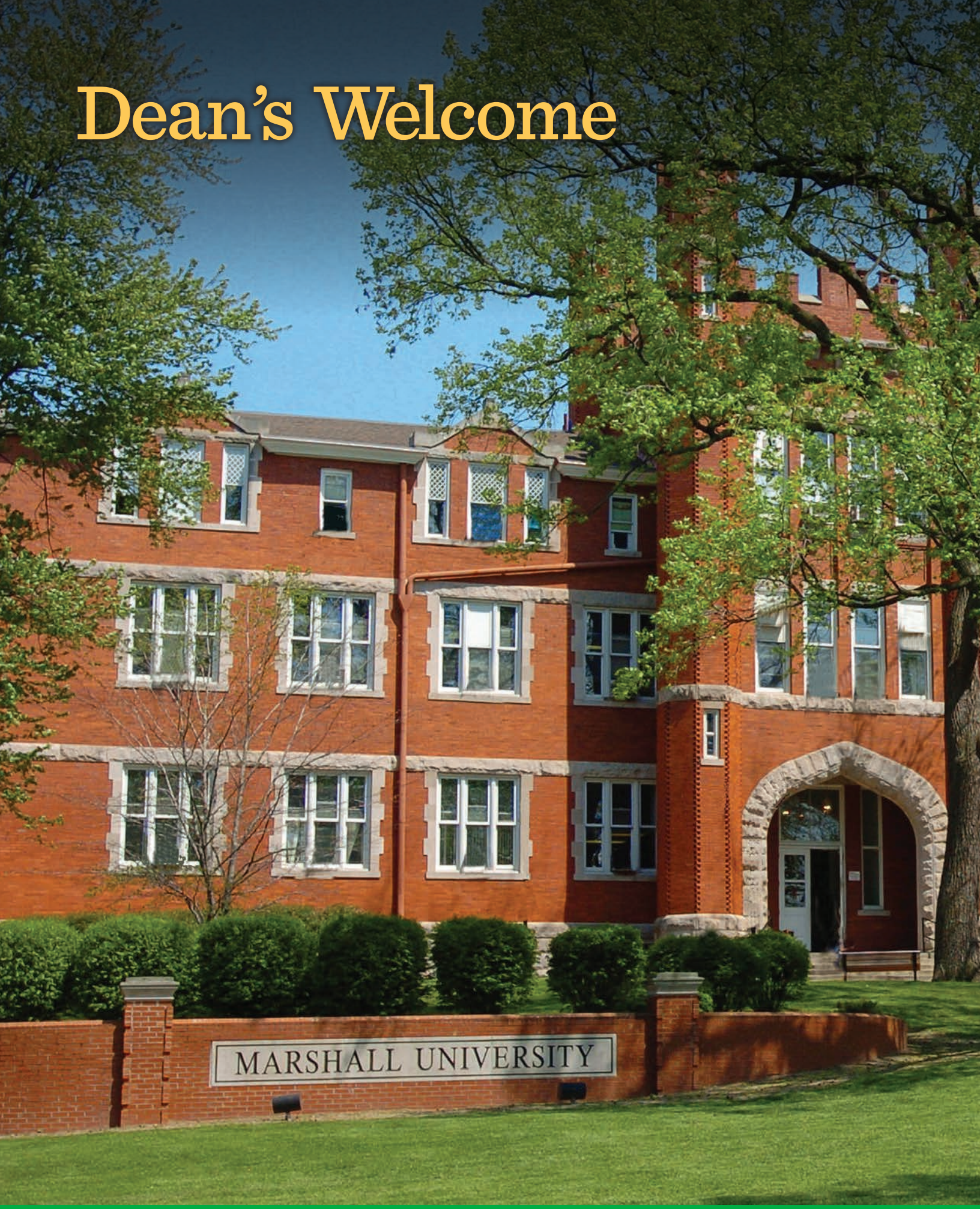
MARSHALL UNIVERSITY

College of Engineering and Computer Sciences

2021 ANNUAL REPORT

Dean's Welcome



I would like to present the 1st Annual Report of the Marshall University College of Engineering and Computer Sciences. As Interim Dean, I am proud of the accomplishments of the faculty, staff, and students of the college, and welcome you to read all about the great things going on in our college. In the following pages, you will see information about students, alumni, staff, faculty, advisory board members, and people who have committed resources to making our college great! We have great things in mind for the College of Engineering and Computer Sciences and Marshall University, and what you will see in this report are efforts directed at the vision we have for our college.

The College of Engineering and Computer Sciences was originally founded as the College of Information Technology and Engineering. At the time, there were only three divisions: applied science and technology (primarily Safety Technology), computer science (Computer Science and Information Systems), and engineering (started with civil engineering). Over the years, the number of programs in engineering grew substantially (mechanical engineering, then electrical and computer engineering, and finally biomedical engineering. Also, in the Computer Science Division, cyber security and data science programs were added. In February 2020, the college was reorganized and renamed the College of Engineering and Computer Sciences with five academic departments: Applied Science and Technology, Biomedical Engineering, Civil Engineering, Computer Sciences and Electrical Engineering, and Mechanical Engineering.

At the beginning of this year, as we were dealing with the Coronavirus pandemic and the associated budget crunch, I was appointed Interim Dean and given the task to make the college more efficient and more effective in supporting the mission and goals of the university. We set out to eliminate any degree programs that were outside of our core mission, so we transferred the MS in Information Systems and MS in Technology Management degrees to the Lewis College of Business, where they had the faculty and resources to grow those programs. We also looked inward and started to make our other degrees more relevant and attractive. We have undertaken an effort to be more efficient by combining classes with overlapping subject material and combining degree programs where it made sense. The M.S.E. in Environmental Engineering and the M.S.E. in Transportation and Infrastructure were combined and renamed as the M.S.E. in Civil and Environmental Engineering. We are currently in the process of combining the M.S. in Safety with the M.S. in Environmental Science into the M.S. in Environmental Safety and Health. This effort will be completed by the Fall of 2021 and will make the graduates of the combined program more attractive to prospective employers.

At the undergraduate level, we have degrees in Occupational Safety and Health, Biomedical Engineering, Civil Engineering, Electrical and Computer Engineering, Computer Information and Security, Computer Science, and Mechanical Engineering. At the graduate level, we have degrees in Safety, Environmental Science, Civil and Environmental Engineering, Engineering Management, Computer Science, Cyber Security, Data Science, Electrical and Computer Engineering, and Mechanical Engineering. We have recently undertaken an effort to plan a doctoral degree in Engineering that would be available to both part-time and full-time students in all of our academic disciplines. We should have more to say about that in our 2nd Annual Report.

We hope you enjoy reading about our accomplishments and will forgive me for wanting to brag about our outstanding faculty, staff, and students. They have made this a great year!

– Dave Dampier

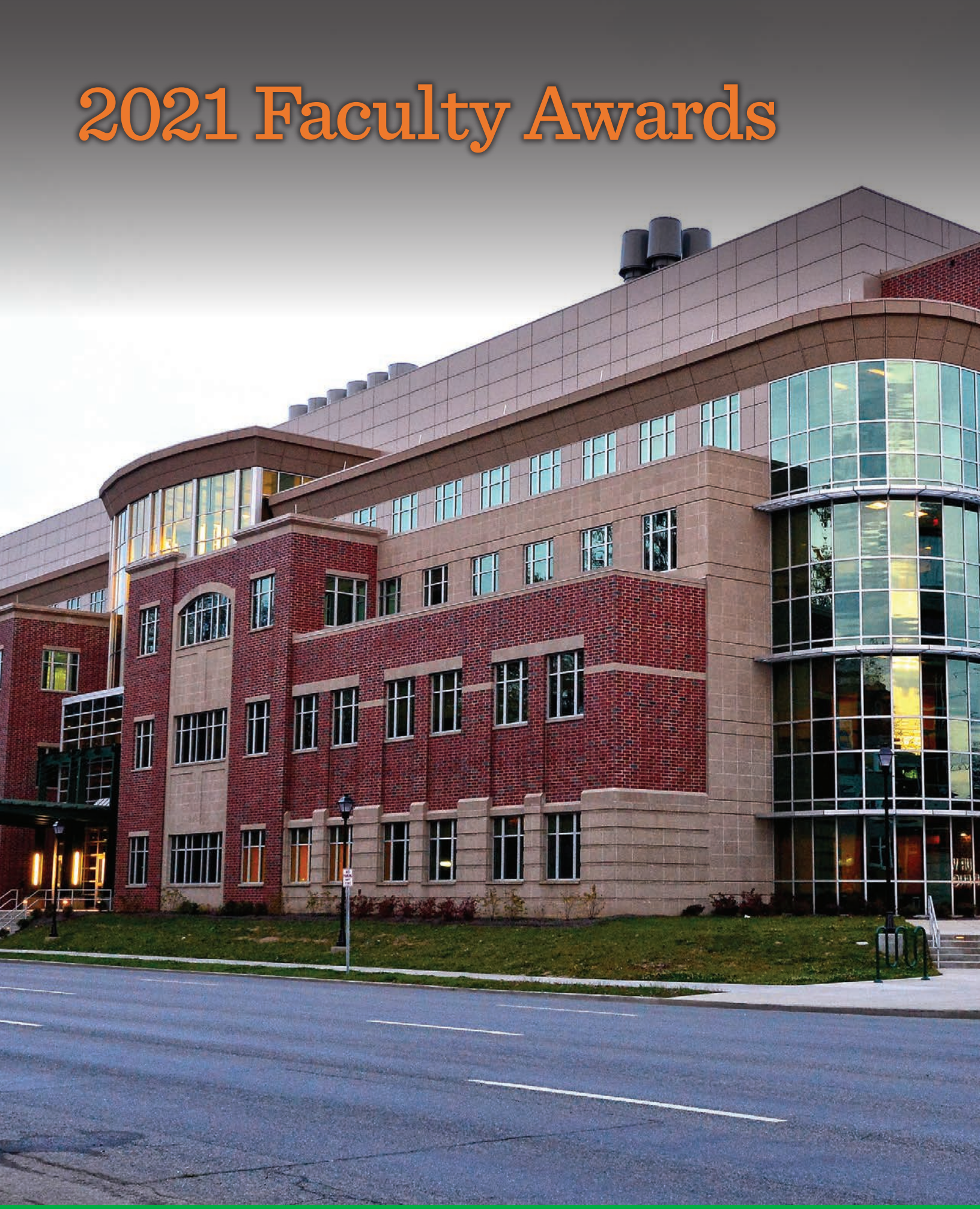
College Advisory Board

- **Dewey Bocook**, Owner, Bocook Engineering
- **Tim Burgess**, VP of Engineering, J.H. Fletcher & Co.
- **Sean Carter**, Chief, Geotechnical and Water Resources, U.S. Army Corps of Engineers
- **Ron Gilkerson**, President, GRW Engineering
- **Doug Hardman**, Former Chairman, J.H. Fletcher & Co.
- **Mike Owens**, President and CEO, Strictly Business
- **Robert Plymale**, COO, Appalachian Transportation Institute
- **Toney Stroud**, Workers Comp Attorney, ENCOVA Insurance (Chair)
- **Joan Weisberg**, Owner, State Electric Corporation
- **Kerry White**, Research and Development Lead, ALCON Huntington

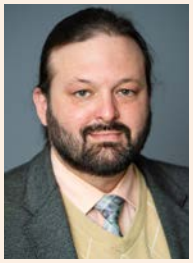
Student Scholarships

- **Nicole Adkins**, Sheldon and Connie Lynn Jones Scholarship CITE
- **Brittany Ballengee**, Gene R. and Betty C. Bargerhuff Scholarship
- **Jarod Banzon**, Gene R. and Betty C. Bargerhuff Scholarship
- **Peter Burbery**, Charles E. Jefferson Scholarship
- **Rachael Bush**, Dr. R.D. Treadway – Safety Tech Scholarship
- **Austin Chandler**, R. Thomas and Judith L. Plummer Scholarship Fund
- **Josie Chapman**, Alan Hissem Scholarship for Engineering
- **Will Coleman**, Joan and Art Weisberg CS Scholarship
- **Isaac Dever**, Howard and Janet Oswald Memorial Scholarship in Engineering
- **James Ellis**, Richard Jarrel Hodges Memorial Scholarship
- **Courtney Hudson**, Vecellio Scholarship
- **Kaitlin Jezewski**, Gene R. and Betty C. Bargerhuff Scholarship
- **Kaitlyn Legg**, Professor Thomas Olson Scholarship
- **Blayne Mastrangelo**, Dr. William and Mrs. Mary Lind Zitter Scholarship
- **Shanekiqua Mitchell**, Thomas and Judith L. Plummer Scholarship Fund
- **Tyler Richard Pelfrey**, Vecellio Scholarship
- **Alyssa Peyton**, Richard Jarrel Hodges Memorial Scholarship
- **Lauryn Poole**, Richard Erwin McCoy, Jr. P.E. Scholarship
- **Zachary Preston**, SMART Scholarship
- **Harrison Randolph**, Engineers of Huntington Scholarship
- **Hannah Rollins**, The Dewey and Judy Bocook Scholarship for Engineering
- **Samantha Saunders**, Howard and Janet Oswald Memorial Scholarship in Engineering
- **Dondre Tate**, Baer/Polan Family Scholarship
- **Jared Terry**, Dr. R.D. Treadway – Safety Tech Scholarship

2021 Faculty Awards



Weisberg Research Award



Dr. James Bryce, Assistant Professor of Civil Engineering – Currently serves as Director of the Intelligent Transportation Laboratory in CECS and as Associate Director of the Appalachian Transportation Institute. Two articles in this report are the result of Dr. Bryce's efforts in research and community service.

Weisberg Service Award

Dr. Paulus Wahjudi, Professor of Computer Sciences – Currently serves as Interim Associate Dean of CECS. On August 1st, 2021, Dr. Wahjudi will transition into the role of Chair for the Department of Computer Sciences and Electrical Engineering. Dr. Wahjudi has had a wide and varied amount of service at Marshall, but for the last three years, he has served an invaluable role as the primary advisor for all engineering and computer sciences students.

Academy of Distinguished Teachers

Prof. Jim McIntosh, Professor of Applied Science and Technology – Jim McIntosh has been teaching applied safety at Marshall for 15 years. Primarily due to his mentoring efforts, the occupational safety and health program has established a robust internship program, and enjoys a nearly 100% placement rate after graduation. He is currently the Chair of the Department of Applied Science and Technology.

Dr. Gregory Michaelson, Associate Professor of Civil Engineering – Dr. Michaelson is an outstanding teacher, having won the Pickens Queen Teaching Award at the university level and being beloved by his students. On August 1st, 2021, Dr. Michaelson will transition into the role of Associate Dean for the college.

Dr. Husnu Narman, Assistant Professor of Computer Sciences and Electrical Engineering – Dr. Narman has been a faculty member in the Department of Computer Sciences since January 2017. During that time, he has distinguished himself as a teacher who sincerely cares about his students. He has taught high school computer science classes, undergraduate classes, and has developed a leadership program for undergraduates that has become so successful, it is being moved to the college level as an Ambassador Program in 2021.

Alumni Highlights

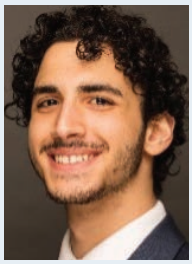
Applied Science and Technology

Mr. Greg Gibson has a Regents B.A. and M.S. degree in Occupational Safety & Health Management from Marshall University, and is a recognized leader in workplace safety with over 25 years of experience. He is a professional member of the American Society of Safety Professionals (ASSP), former President of the WV Chapter of ASSE and current member of the Kentucky Safety & Health Network. He is also a current member of the Cabell & Wayne County Local Emergency Planning Committee (LEPC). Greg has also served as a Pro Board® certified firefighter and Safety Officer for Catlettsburg Refining's Emergency Response Team, Oil Spill Response Team and Air Monitoring Team. Currently, he is the Safety Supervisor for Marathon Petroleum Company's Catlettsburg Refinery, with 16 years of successful leadership in the refining and petrochemical sector. He is responsible for overseeing the safety and health of employees and contractors that work at the facility. Greg has been very active as a member of our Advisory board, hosting student tours at the refinery, and is an advocate for our interns within Marathon.

Ms. Alicia Cunningham holds a B.S. degree in biology and an M.S. degree in Occupational Safety and Health from Marshall University. She began her career as an intern for BrickStreet Insurance. Immediately following graduation of the master's degree program at Marshall, she was hired as a Safety and Loss Control Specialist. Alicia is now a Senior Safety and Loss Control Consultant for the West Virginia Large Team at Encova Insurance (formerly BrickStreet Insurance). She has extensive experience in the oil and gas industry and related support industries. Ms. Cunningham has served as the co-chair of the WVONGA Safety committee from 2019-2021. She served on the planning committee for the Red Cross STEM events in 2019 and 2020. The STEM Goes Red events were outreach programs for 6th, 7th and 8th grade girls in Kanawha County. She also is a very active member of our Advisory board and has served as the Marshall Safety Conference committee chair since 2016.

Ms. Lindsey Prichard graduated from Marshall University, Magna Cum Laude, with a B.S. in Occupational Safety and Health in May of 2020. She was the 2018 BCSP student scholarship winner and the Vice President of the Marshall University chapter of the ASSP. The summer before she graduated, she completed the Safety co-op program at Toyota Motor Manufacturing West Virginia. In September of 2020, she began her career at Toyota Motor Manufacturing West Virginia (TMMWV) as a Safety Analyst. TMMWV is in Buffalo, WV, with approximately 1,800 employees, where engines and transmissions are produced for multiple different Toyota vehicles. In her position as a Safety Analyst, she conducts many different safety activities, trainings, audits, and meetings within the plant. She is looking forward to continuing her career at TMMWV as a Safety Professional in the automotive industry.

Biomedical Engineering



Mr. Abdullah Hijazi is a December 2020 graduate of the B.S. Biomedical Engineering program at Marshall. One of the first three graduates of the program, he got his first job doing COVID-19 Contact Tracing with the Virginia Beach Department of Health during his last semester at Marshall. After getting his degree, he was promoted into the case investigation side of the contact tracing process. He says that his education did not end with graduation. He has found a passion for programming and has taught himself Python. He is working to develop skills in Machine Learning, and plans on going for his master's degree in the next year or so. He hopes to be able to blend these new skills with what he learned as a biomedical engineer at Marshall.

Civil Engineering

Mr. Isaac Fadiga, originally from Beckley, West Virginia, is a 2018 graduate of Marshall's Bachelor of Science in Engineering program, with an emphasis in Civil Engineering. Upon graduating from Marshall, Isaac was offered a position at The Thrasher Group, Inc., in Charleston, West Virginia. He is currently working on projects in the area of water and wastewater treatment, which he enjoys due to the satisfaction of working on problems with technical complexity, and because his work helps to protect the environment and provide important services to the general public. He has passed the Fundamentals of Engineering exam, is certified as an Engineering Intern, and is preparing to take the Principles and Practice of Engineering (PE) exam, so that he can become a licensed Professional Engineer. In addition to his technical abilities, Isaac also has musical talents, with songs and music videos available on all the major streaming platforms under his stage name, "Shelem."

Ms. Rachel Carder, from Short Gap, West Virginia, graduated from Marshall University in 2017 with a B.S. in Engineering with a Civil Emphasis. After graduation, Rachel began a career in structural engineering in the Washington DC area with Leuterio Thomas, LLC. Since employment, Rachel has provided design and contract documents on a wide range of steel design and concrete renovations for both private commercial buildings and federal buildings/structures.

They include renovations and repair works for the DC metro (WMATA) stations, including the addition of new egress stairs for the stations, rehabilitation design for pumping stations within the tunnels, and the structural design of three curved stainless-steel canopies for the station entrances.

Rachel has also worked on numerous steel design jobs, including the renovation of two local public schools to upgrade their heating and cooling systems, a 100'x64' building expansion for a biopharmaceutical building, and the addition of flood barriers for historic federal buildings in DC. Rachel's largest job yet has been a multi-phase design and construction project of two 200,000 total square foot buildings for a gene therapy biomanufacturing facility.

Rachel will be taking the professional engineer exam later this year and is excited and looking forward to an expanding career in structure design.

Mr. Adam Weible is originally from Huntington, West Virginia, and after serving as a U.S. Marine, including a tour in Iraq, came to Marshall to pursue a degree in engineering. He is a 2012 graduate of Marshall's Bachelor of Science in Engineering, Civil Engineering emphasis program, and also is a 2017 graduate of Marshall's Master of Science in Engineering, Engineering Management program. He is the Regional Manager of Prime Engineering, having recently opened their new office in Huntington, across from Pullman Plaza. As a licensed Professional Engineer in more than 10 states, he has experience in a wide range of civil, mechanical, and electrical engineering areas, with particular focus in structural analysis and design, and all phases of design for the oil and gas projects in which Prime specializes. When not working in the office or in the field, Adam hunts, fishes, and enjoys spending time with his wife and young daughter.

Computer Sciences and Electrical Engineering

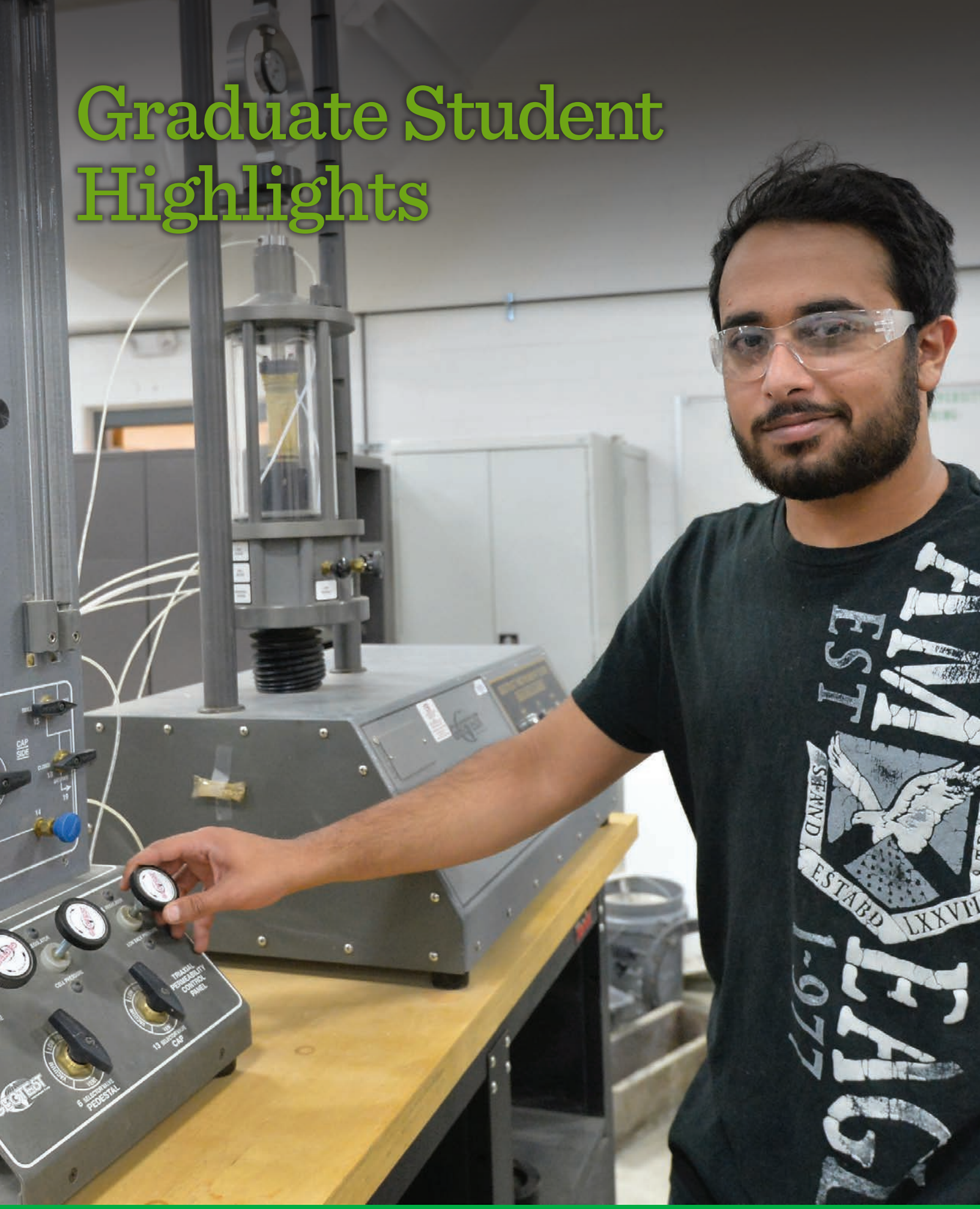
Mr. Shawn Cheeks, a graduate of River View High School in Bradshaw, WV, graduated from Marshall University, Summa Cum Laude, with B.S. degrees in Computer Science and Applied Mathematics in May 2015. While at Marshall, he was a student vice president of The Honor Society of Phi Kappa Phi and a student video manager for the Marshall Thundering Herd football team. Upon graduating from Marshall, he received a research assistantship from the Atmospheric and Oceanic Sciences program at Princeton University. He has gone on to receive a M.A. in Atmospheric Science in September 2017, and he continues his work on a Ph.D. in Atmospheric Science. In August 2020, he started a data science career with Lowe's Home Improvement where he focuses on space optimization.

Ms. Sarah J. Mercier, VP Expert Engineer at JPMorgan Chase & Co. – Sarah is originally from Parkersburg, West Virginia, and graduated from Marshall University in 2012 with a B.S. in Computer Science. Throughout her college career, Sarah balanced a full course load with hands-on work experience as an intern at Strictly Business Computer Systems while also frontrunning the Web Development and e-Marketing efforts for the Marshall University Foundation. In her current role at JPMorgan Chase, Sarah is a technical lead and key strategic driver of overall API development and documentation practices for the core of the firm. In addition to her day-to-day responsibilities, Sarah focuses on recruitment, engagement, and coaching of new and diverse talent through her contributions to the Software Engineering Program (SEP) and by speaking on Diversity and Inclusion technical panels for the firm. Her most significant impact to the retention of top talent at JPMorgan Chase & Co. is through her role as lead for the Summer Intern Technical Events in Columbus, Ohio, which will be sharing events nationally with other JPMorgan Chase locations within the U.S. for the first time in 2021.

Mr. Geoffrey Samples graduated from Marshall University with a B.S. in Computer Science in May of 2018. Before coming to Marshall, Geoffrey was a graduate from Winfield High School and an Eagle Scout from Troop 283 in Teays Valley, WV. During his time at Marshall he worked with the Computer Science faculty and the WV Department of Education to create a web based academic calendar system. This dynamic system replace the old excel based system and is currently being used to enter, modify and publish the academic calendar for every county. He also worked with a group of students to develop a cyber warfare tool that would test students' knowledge of system hardening and network security as part of his capstone project. Currently, Geoffrey is working as a Computer Scientist for the Army Corps of Engineers in Huntington WV. In this position he builds and maintains data management tools for the Dam Safety Center. He also collaborates with other developers and their teams to keep the Army Corps of Engineers on the bleeding edge of technology.


SUMMER

Graduate Student Highlights



Safety

Mr. Nicholas Martin is a graduate student in the Occupational Safety and Health program at Marshall University. He is from Mineral Wells, West Virginia, and is expected to graduate with a master's degree in Fall 2022. He is currently an employee at the Marshall University Office of Public Safety. On being an Occupational Safety and Health major: "I have always had an interest in protecting others and keeping my community safe. I want to become a safety professional in order to transfer that interest to the safety field. My ultimate career goal is to better serve any community in which I have the honor of working."

Mr. Berry Phillips is currently working on a master's degree in occupational safety and health at Marshall University. He holds a BA in math and general science from Glenville State College and an MS in Physics from MU. Berry retired from the Army National Guard as a Master Sergeant after serving in Operation Iraqi Freedom and Enduring Freedom and has been teaching math and science in public schools for 30 years.

Personal goals: "I plan to retire from teaching in the public schools to work in the health and safety field. I want to combine the experience I gained in the Army as an Nuclear/Biology/Chemical force protection Non-Commissioned Officer with my love of education, together to insure people understand how to do their jobs in such a way that everyone gets to go home to their loved ones at the end of the day."

Computer Science

Ms. Vishwanshi Joshi is a student in the Master of Science in Computer Science program at Marshall University. She is currently working on her thesis under the supervision of Dr. Sanghoon Lee to effectively process whole slide images. She was recently named a winner of the Special Interest Group on Computer Science Education (SIGCSE) Student Research Competition (SRC) 2021, hosted by the Association for Computing Machinery (ACM) and Microsoft with her research paper, titled "U-Net-based Active Learning Framework for Enhancing Cancer Immunotherapy." As one of the chosen winners, her paper will be published in the proceedings of the ACM SIGCSE 2021.

Cyber Security

Ms. Hwapyeong Song is a graduate student studying cybersecurity in the Department of Computer Sciences and Electrical Engineering. Song graduated from Marshall with a B.S. in Computer Science and was an intern at West Virginia Small Business Development Center and West Virginia Department of Education. She has been involved in various web and cybersecurity projects as an active member in the CS Leadership Program. She recently received the Best Poster Award in the joint technical conference on Artificial Intelligence (AI) in Smart Cities in 2021 with her paper titled "A Study of Implementing Smart Combined Sewer Systems," focusing her research on how data analysis techniques can be applied to real-world problems to find effective solutions.

Electrical and Computer Engineering

Mr. Jonathan Warner is a graduate student studying Electrical & Computer Engineering at Marshall University who currently resides in Putnam County, West Virginia. Jonathan graduated in May 2021 with a Master of Science in Electrical & Computer Engineering. As part of the requirements for his degree, he has completed a master's thesis, entitled "Peer-to-Peer Energy Trading for Networked Microgrids" in the field of power and energy systems. Additionally, his thesis research has produced a journal paper, "A Blockchain-Enabled Decentralized Energy Trading Mechanism for Islanded Networked Microgrids," and a conference paper, "Decentralized Peer-to-Peer Energy Trading Model for Networked Microgrids," both published with IEEE. Jonathan is currently employed as the Technical Director and Production Manager of Church at the Depot. Upon earning his M.S., Jonathan plans to take time to evaluate all possible employment and further education opportunities through the lens of his passions for research, science education, and community engagement.

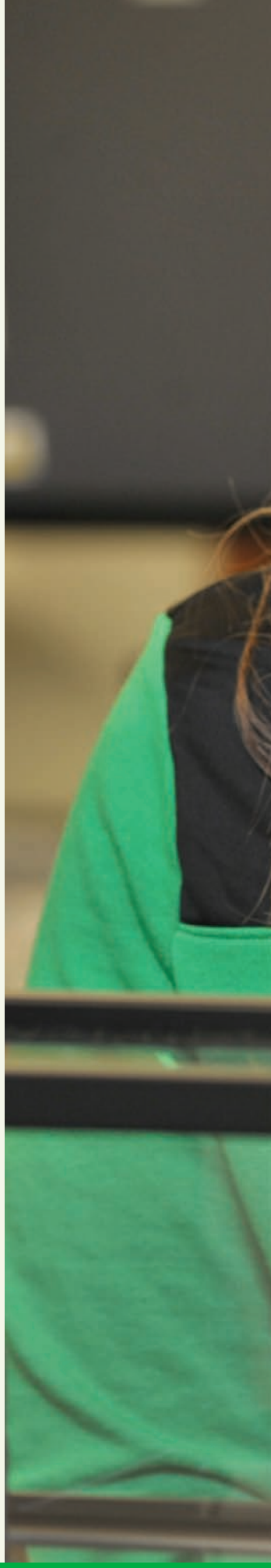
Engineering Management

Mr. Sharique Khalid is originally from Rawalpindi, Pakistan, where he worked in the safety department for Toyota before deciding to pursue an education in the United States. He selected Marshall after hearing about it from a friend, who was an alum and who described the small class sizes, personalized attention, and supportive atmosphere. Sharique earned a Bachelor of Science in Safety Technology from Marshall in 2019, before working for several years as a safety manager at a major hotel chain in Orlando, Florida. He recently returned to Marshall to enroll in the Master of Science in Engineering program, where he is currently taking courses in project management, operations management, and quality improvement. In the coming months, Sharique will begin working for a faculty member as a research assistant, and is eager to apply his experience and education to solving complex problems. In his limited free time, Sharique enjoys traveling to different locations within the United States, and playing soccer.

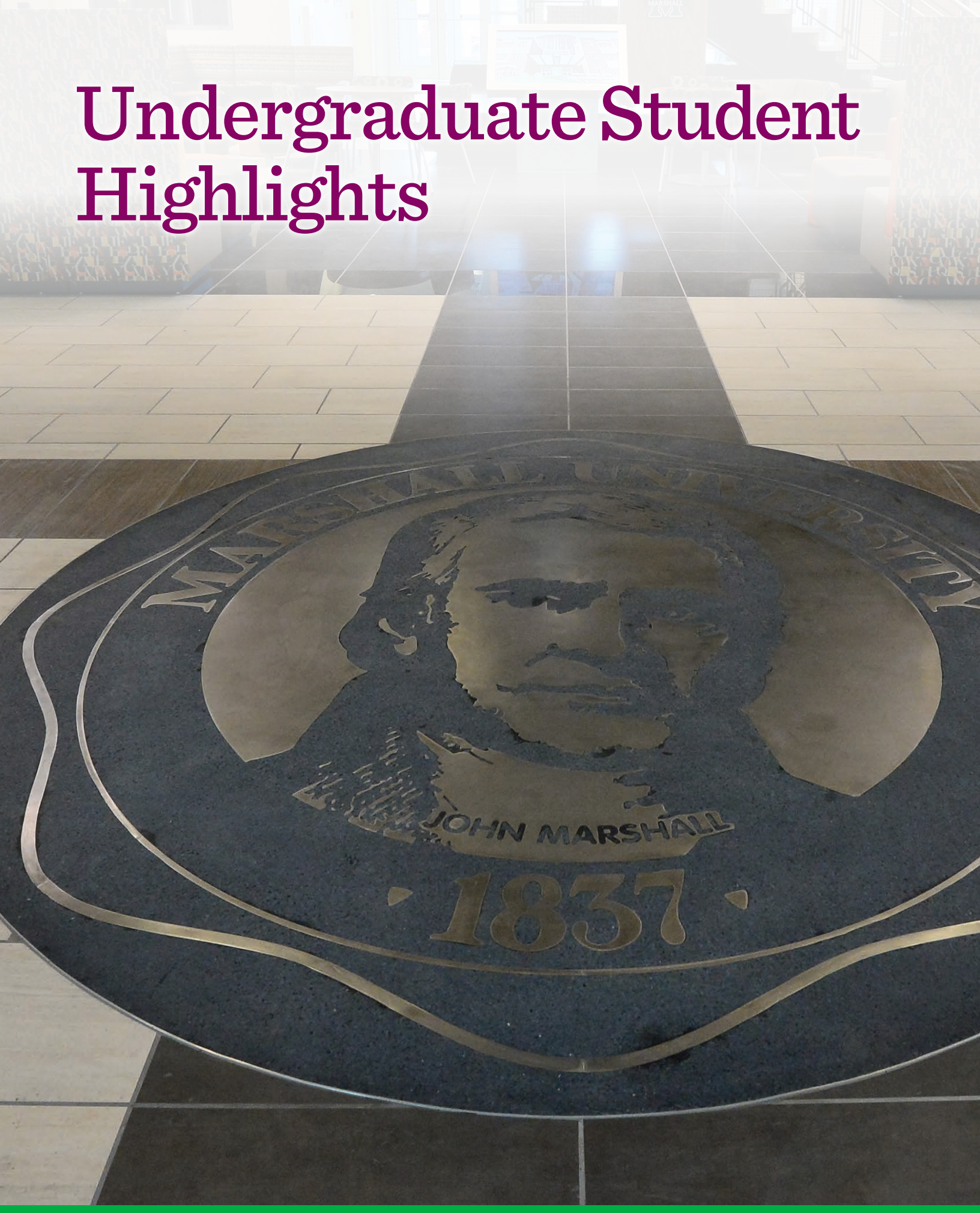
Mechanical Engineering

Ms. Brittany Ballengee is a senior graduating in mechanical engineering at Marshall. She is interested in fluid dynamics and thermodynamics. Brittany has done research on the fluid dynamics of a horn fly's mouth and presented at the West Virginia Entomological Society's Winter Meeting. She also has researched and created a shark skin inspired coating to place on a wind turbine blade used for wind power to increase the efficiency of the blade. For the future, Brittany is considering pursuing a master's degree in mechanical engineering at Marshall University.

Ms. Abigail Chaffins is a graduate student of Mechanical Engineering in the College of Engineering & Computer Sciences at Marshall University. In Fall 2020, she completed a research project under the direction of Dr. Ross Salary on process optimization, with the aim to fabricate bone scaffolds with tunable functional properties. Based on the outcomes of the work, she submitted a paper to the 2021 ASME Manufacturing Science and Engineering Conference; the paper has been accepted for publication in the conference proceedings as a peer-reviewed paper.



Undergraduate Student Highlights



Applied Science and Technology

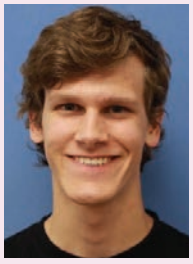
Ms. Danielle Berry is a junior in the Occupational Safety and Health program at Marshall University. She is from Barboursville, West Virginia, and is expected to graduate in May 2022. She is currently a safety intern at Special Metals Corporation in Huntington, West Virginia, and she was one of the 27 national recipients of the 2020 Board of Certified Safety Professionals (BCSP) QAP/GSP Scholarship. Danielle wants to become a safety professional because she wants to send everyone home at the end of the workday safe and healthy. Currently, she would like to work in any industry, and believes every job has the potential to be done safely.

Ms. Megan Hall is a senior at Marshall University pursuing a Bachelor of Science in Occupational Safety and Health and a minor in English and Professional Writing. After high school, she decided to further her academics in Occupational Safety and Health because she enjoys helping people work safely and efficiently. She has worked as an intern in the safety department at Marathon Petroleum in 2019 at the Catlettsburg, Kentucky, refinery. She plans to graduate in Fall 2021, and would like to work in the oil and gas industry.

Ms. Shanekiqua Mitchell from Princeton, West Virginia, is a junior in the Occupational Safety and Health program at Marshall University. She chose the safety program because, to her, it is a perfect mix of math and science. Her favorite part about the program is the continuous learning from one course to another and how it is related to real life events. Shanekiqua is the Vice President of Marshall University's ASSP Chapter, and this summer and fall will co-op with Toyota Motor Manufacturing West Virginia.

Ms. Rachael Bush is a senior in the Occupational Safety and Health program at Marshall University. She is from Rush, Kentucky, and currently has an internship with J.H. Fletcher & Co. in Huntington, West Virginia. On being an Occupational Safety and Health major: "I want to pursue a career in safety because there are so many opportunities. Safety is needed in any workplace, so there are many options for the type of industry you want to work in. It's also a great way to help people — teaching workers how to perform their jobs safely, and helping companies provide a safe environment."

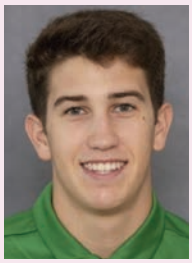
Biomedical Engineering



Mr. Christoph Hart is a senior in Marshall University's Biomedical Engineering program. He graduated as the Salutatorian of his graduating class at Charleston Catholic High school. During his high school career, he participated in Boy Scouts and earned the Eagle Scout rank. This May, he will be graduating Summa Cum Laude with honors. He has been accepted into biomedical engineering PhD programs at the University of Iowa and the University of Maryland and has committed to the program at the University of Maryland with the current intent to study tissue engineering and enter academia upon earning a PhD.

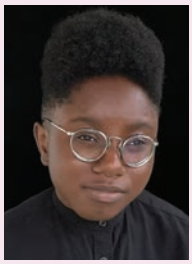
Civil Engineering

Ms. Josie Chapman from Summersville, West Virginia, is a junior in Civil Engineering at Marshall University. She chose Civil Engineering because it provides her with several different paths to choose from after graduation because of the broad range of Civil Engineering projects in the real world. Her favorite part about the program is learning about how the topics she's learning about in her classes will be applied in her future career. Josie loves the community created within the Civil Engineering department and appreciates how much the faculty members care about the students. She will begin an internship this summer with the U.S. Army Corps of Engineers, in the Dam and Levee Department, that will continue throughout the remainder of her schooling.



Mr. Brett Armbruster from Barboursville, West Virginia, is a sophomore in the Civil Engineering program at Marshall University. He chose this program because he enjoys designing and building things, and knowing how it's done. He comes from a long line of Civil Engineers in his family and wanted to be a part of that. He also is on the cross-country team at Marshall University, which takes up the rest of his free time aside from studying. Brett will be doing a co-op at the WVDOH again this summer.

Computer and Information Security

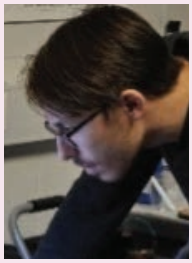


Jacqueline Brown is a first-generation undergraduate Computer and Information Security major at Marshall University. Jacqueline was one of 10 students awarded the Summer Undergraduate Research Experience also known as the S.U.R.E program at Marshall University in 2021 and has two Computer Science research papers published in IEEE Xplore. Jacqueline is also secretary of Marshall's Geeks and Gadgets organization that works to introduce and enhance the knowledge of technology to the campus community. Jacqueline is also the Vice President of Vex Robotics at Marshall University team SQL. Jack is also apart of the Black Society of Scholars that is prestigious society of African Americans on campus that do community service-learning projects for the Huntington community. "Obstacles don't exist to stop you," Jacqueline says. "They exist to guide you to do better than you know."

Electrical and Computer Engineering

Mr. Jarod Banzon is a senior undergraduate student majoring in electrical and computer engineering at Marshall University. He is from Salt Rock, West Virginia, and is expected to graduate in May 2022. He is currently planning on participating in an electrical engineering internship at EN Engineering in Summer 2021, where he will aid in designing and managing power generation and transmission systems and industrial hardware among many things. Jarod eventually wants to be a computer or electronics engineer because he enjoys fabrication and design of practical digital hardware.

Mechanical Engineering



Mr. Cole Klemstine was selected as a recipient of a Creative Discovery and Research Award for Spring 2021. Mr. Klemstine is an undergraduate student of the Bachelor of Science in Mechanical Engineering program in the College of Engineering and Computer Sciences at Marshall University. Currently, he is completing a research project on bio-fabrication and material characterization with a focus on bone tissue engineering under the direction of Dr. Ross Salary.

Mr. Thomas Cornett is in his last semester in the mechanical engineering program at Marshall University. Thomas has held a variety of leadership positions in multiple student organizations. Throughout his four years at Marshall, he has worked in an engineering internship, been awarded undergraduate research, won the great innovator award at the WV Makes festival, and participated in a local business accelerator program.

Ms. Olivia Rogers graduated in Spring 2021 with bachelor's degrees in mechanical engineering and Spanish. "Over the past four years, the wonderful and encouraging faculty and staff at Marshall have provided me with an incredible education and many opportunities to learn and grow," Olivia said. She has been a student research assistant for the past two years. During that time, she has gained experience designing experiments, analyzing data, operating machinery such as the Scanning Electron Microscope, and presenting her research at conferences. This Spring, her group published a journal manuscript in Nature's Scientific Reports. This year, she has been conducting a capstone project aimed at creating a bio-inspired coating to improve the power output of wind turbines. The coating is mimicked after the surface texture of shark skin, which creates a turbulent boundary layer and reduces the drag produced as the animal swims. After graduating, she will be attending Cornell University, where she will pursue a Masters in Materials Science and Engineering.

Cooperative Education

By Tanner Drown

According to the U.S. Bureau of Labor Statistics, post-COVID economic projections point to a need for a million more STEM professionals than the United States will produce. If these projections hold true, the U.S. labor industry will see an insurmountable gap in the areas of science, technology, engineering, and mathematics (STEM) over the next decade. While the STEM fields can be among the most competitive, colleges and universities across the country are rapidly responding to these predicted challenges…and Marshall University is no different.

Currently, our students experience rigorous academic training with hands-on labs, ample research initiatives, state-of-the-art facilities, and capstone projects during their undergraduate tenure in the College of Engineering and Computer Sciences. Yet, nothing compares to the learning that occurs in real-world settings — especially within the STEM fields. In fact, many employers are requiring professional experience from new graduates for consideration of entry-level positions. Marshall University is addressing this need by initiating an undergraduate employment opportunity via participation in the new CECS Co-Op program.

Co-Op is an agreement between the University and employers wherein students are granted full-time employment opportunities with pay during their educational process. This is a win-win for everyone: the student receives the benefit of obtaining work experience, income, professional networking, and often a permanent job offer following their Co-Op tenure. This type of experiential learning also further enhances the University's mission to develop our students to enter the workforce upon graduation. Furthermore, our employer partners have been extremely committed to the program from its inception just a little over a year ago. Our current partners are providing both positions and financial support as we continue to build the Co-Op program. We are also excited that many Marshall University alumni throughout the Tri-State region have become involved in our new initiative.

The process begins with participation in ENGR 217 (Orientation to Co-Op). This course will guide students how to navigate the Co-Op experience. The course also covers resume writing, interviewing skills, and other procedures associated with the program. After completing the course, students will apply to the Co-Op program. Many opportunities are posted online through Handshake, which serves as Marshall University's mobile job database for students and is operated by the Office of Career Education. The CECS Co-Op Coordinator will communicate these opportunities to students via email while also providing assistance with their resumes to submit on Handshake for employers to view. Students are required to be free of any academic or disciplinary holds, must pass the orientation course, and have a cumulative GPA of 2.0 to participate in the program. Also, some employer partners may have additional requirements (i.e. particular courses completed or a higher GPA).

CECS students usually gravitate naturally towards a Co-Op or an internship experience during their junior or senior year. During this time, and in addition to their other coursework, students should dedicate at least two semesters to

obtaining on-the-job training within their chosen career industry. An outstanding benefit to the Co-Op experience is that Marshall University will not charge tuition for any Co-Op courses , nor will students jeopardize any financial aid while participating. When a position is secured, an agreement is signed by the student, the employer, and the University.

Once the agreement is signed by all parties, students may enroll in the Co-Op course based upon their major. The Co-Op Coordinator will oversee all courses: ENGR 350 for Engineering, SFT 350 for Applied Science and Technology, and CS 351 for Computer Sciences. Following completion of two semesters of Co-Op experience, students will be awarded a certificate and an attribute will also be indicated on the students' transcript. The program is currently available for undergraduate students, but there has been interest at the graduate level; this interest is being further explored.

As Spring of 2021 was the initial semester for Co-Op students to begin in the field, there were 7 students who obtained full-time, paid employment and completed all aspects of the program. Students are asking how to be involved with Co-Op and are implementing it into their academic plans prior to graduation. Although it was created to focus on undergraduate students, graduate students are also requesting to participate. In addition, I have also had requests to include students from other colleges within Marshall University. Currently, there are 36 students enrolled for the summer semesters of 2021 and 16 employer partners participating. Even with economic uncertainty, the program is thriving.

The initiative began with the creation of my position of CECS Co-Op Coordinator in the spring of 2021. As a multiple graduate of Marshall University, I recently obtained my master's degree in leadership with a minor in safety. I personally understand the invaluable advantage students possess if they can gain professional experience (within their chosen field) prior to graduation. It is so exciting for a student to call me and hear that a job offer was made, to be told how much was learned from the experience, or to find that plans existed to continue employment permanently upon graduation. That is what we are all seeking to accomplish! It is my hope that every Marshall University student become successfully employed upon or even before graduation.

In closing, Co-Op is not mandatory at this time but many of our students are already anxious to participate. As the post-COVID economy continues to shift, our students are increasingly understanding the value of securing employment upon graduation. Students may also question whether the additional investment of time required to complete the Co-Op experience is worth it: the answer is a resounding "YES!" Co-Op experience will yield a competitive edge to students hoping to obtain their dream job. The inaugural CECS Co-Op cohort began their professional journey in Spring 2021. We are looking forward to following their progress and reporting on their successes!

Anyone interested in obtaining information on the program is encouraged to explore the website for Marshall University's College of Engineering and Computer Sciences Co-Op program at **www.marshall.edu/cecs/co-op**. This website includes a detailed handbook, application, contractual agreements, and frequently asked questions for both students and employers. For all others questions regarding the program, email drown12@marshall.edu or call 304-696-3561. Interested students can also visit the CECS Dean's Suite in the Weisberg Family Applied Engineering Complex (Room 2103-C).

Restoring and Mapping the Abandoned Bethel Memorial Cemetery

By James Bryce

Figure 1 – Many graves of military veterans, such as the one pictured above, have been lost in excessive brush growth. Others have been broken and buried in years of leaves and mud. Volunteers are working to clear the brush and identify the locations of graves.

Civil engineering students and faculty have been working with Huntington community members to restore and map the abandoned Bethel Memorial Cemetery, which is home to over 800 graves, many of which are military veterans and most of which are African Americans. The cemetery opened in 1914 and remained open until the late 1960s, at which point it was sold in a court mandated auction. The catalyzing event for the sale was the construction of Interstate 64 and disagreement over the distribution of the money resulting from the purchase of part of the land for right-of-way of the interstate. Consequently, the cemetery has been mostly neglected for the past 40 to 50 years, with many headstones broken or lost to time, excessive brush growth and similar issues associated with land that is left for nature.

In 2017, the National Society Daughters of the American Revolution published a book on the Bethel Memorial Cemetery that identified the graves and lineage of many people who were buried there. Around the same time, family members of those buried at Bethel approached the Huntington City Council to ask that something be done so they can visit the burial site of their loved ones. This helped spur interest among several community leaders who reached out to the Marshall University College of Engineering and Computer Sciences to identify someone willing to help with the effort. In late 2019, Dr. James Bryce (Assistant Professor in Civil Engineering) joined with the community members to work on restoring the cemetery with the goal of returning it to public land. The land that contains the cemetery was purchased in 2006 by Earl and Deborah Arentz, and they have fully supported the effort to restore and return the cemetery to public access.

The plan for the cemetery is to first clear the land that contains gravestones, being careful not to disturb the stones or other potential grave markers. Then, the existing gravestones will be mapped and detailed so that they can be uploaded into a GIS application. Additionally, ground penetrating radar (GPR) is being deployed to attempt to identify unmarked graves and, ultimately, the boundaries of the cemetery. Unfortunately, there are many locations in the cemetery where ground indentations in-line with other headstones indicate a possible grave without a marker, and the hope is to use GPR with other site information to have more confidence in the locations of unmarked graves.

In January and February of 2020, more than 150 Marshall University students from all disciplines and faculty from the Department of Civil Engineering volunteered over multiple days to work on clearing the brush from around gravestones. Although the COVID-19 pandemic slowed the efforts throughout much of 2020, Dr. Bryce and students continued efforts that included mapping the site. Volunteer efforts have recently restarted, and many University organizations, such as the Student Government Association and Greek Life have joined the efforts.

Figure 2 – Students Volunteering at Bethel Memorial Cemetery for the 2021 Day of Service for Marshall University

Through this volunteer effort, many Civil Engineering students have gained experience using GPR, gathering data and evaluating the results. The students have mapped the location of hundreds of graves using surveying equipment, and the locations of those graves have been cross-referenced with pictures of the headstones (where they exist). Students have also gained valuable insight into community engagement and leadership and have seen how engineers can use their knowledge to help local communities in unique and impactful ways.

Figure 3 – Marshall University Civil Engineering Students Using GPR to Map Graves

Dr. Bryce and the students will continue their efforts at Bethel Memorial Cemetery through the time that it can be opened back to the public and family members of the buried to visit. Their hope is to identify likely locations of unmarked graves, delineate the land with graves from the land without graves, and then post the results and data for the public to freely access. Although the history of the cemetery being abandoned cannot be undone, mapping and gathering the data to post for the public is one step towards showing respect to the families of the many civilian and military deceased buried there.

Civil Engineering Professor Helps Develop WV's First Press-Brake-Formed Steel Tub Girder Bridges

By Greg Michaelson

Dr. Greg Michaelson, P.E., an associate professor of civil engineering at Marshall, has assisted the Short Span Steel Bridge Alliance (SSSBA) and the West Virginia Department of Highways (WVDOH) in developing West Virginia's first two press-brake-formed steel tub girder bridge. The first was located near East Lynn in Lincoln County, WV and was completed in Fall 2019; the second was located near Mannington in Marion County, WV, and was completed during the Summer 2020.

The press-brake-formed tub girder system consists of galvanized shallow trapezoidal boxes fabricated from cold-bent structural steel plate. A concrete deck is precast on the girder, making it a modular unit that can be transported by truck to the project site. The system is ideal for spans in the 40 to 80 foot range. It has the potential for significant time and cost savings since the superstructure can be installed as single modular units (usually in one or two days by local crews), will last for an estimated 100 years, and requires minimal maintenance during its lifetime. Also, the expedited installation process ensures the new bridge is opened for service in a timely manner, minimizing disruption to traffic.

The Short Span Steel Bridge Alliance aims to keep bridge owners and designers informed about the benefits, latest design innovations, cost competitiveness and performance of steel in short-span installations up to 140 feet in length. Dr. Michaelson is part of the SSSBA's Bridge Technology Center. Dr. Michaelson, along with Dr. Karl Barth of West Virginia University, have conducted extensive research on the press-brake-formed steel tub girder system for the past six years, including development and design, experimental testing, field evaluations, and feasibility and economic studies.

"We envision the PBTG system as the future of short span steel bridge design," Michaelson said. "West Virginia is the fifth state in the U.S. to implement this new system, along with Iowa, Ohio, Michigan and Texas. We commend the WVDOH for recognizing its potential as well as ORDERS Construction and Clearwater Construction for turning our dream into reality."

The focus of Michaelson's research for past few years has been trying to make short-span steel bridge design more economical and efficient. Of the nation's roughly 600,000 bridges, more than 90% are short-span bridges that are less than 150 feet long, he said. "If you find a way to make short-span bridges more economical, you save taxpayers a lot of money," Michaelson said. "WVU and Marshall came together on this, and it was great that we produced something that is actually being used. As a researcher, you hope that your work has a direct impact. There are going to be folks driving over this every day, so there's a real benefit."


MARSHALL

Civil Engineering Faculty and Students Developing Rail Track Inspections Technologies

By Richard Begley

Railroads play a crucial role in the U.S. economy. Although cars and planes now dominate passenger transportation, freight transportation is growing significantly. Rail intermodal (transportation of goods in shipping containers) has tripled in the last 25 years. Increased use, coupled with weather erosion, brings a higher probability for track damage and an increased need for track inspection. With this in mind, Marshall University researchers are developing the technology that will quickly assess railroad tracks for structural integrity and potential problems. Of particular focus is the transportation of heavy freight for the U.S. Military.

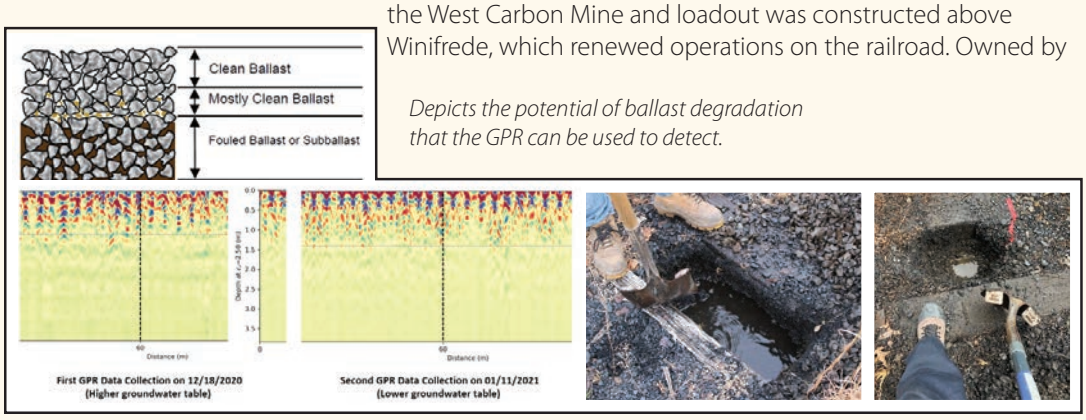
"We are currently using a partially inactive railyard to calibrate ground penetrating radar (GPR) to improve rail track inspection technologies," said Dr. Richard Begley, project lead. "This early stage involves people-powered inspections, but we will soon be using our hi-rail research vehicle to start full scale testing on active rail lines."

GPR has many potential benefits to investigate the track infrastructure with particular interest in identifying the presence of ballast degradation or fouling and or the presence of water from inadequate drainage that occurs over time and may also be the result of climatic events.

Essentially, we are collecting GPR data and then comparing the data with samples we collect and process in our lab to help calibrate the GPS instrumentation as shown below. This site has proved to be very beneficial to our research especially in the ability to detect water.

After post processing the data from the GPR instruments, an image is produced to allow for the analysis of the ballast condition including the presence of water, which can be a major track safety problem. See GPR comparisons, ballast sample hole images and track subsurface conditions above.

The tracks to be inspected lie on property once used by the Winifrede Railroad to transport coal to and from mines, beginning in 1882. Through the early 20th century, the Winifrede Railroad operated two Mogul locomotive trains through challenging mountainous terrain. Among the earliest railroad locations in West Virginia, the roughly six-mile track includes a river coal dock, a marshaling yard and an old engine house along its path. The Winifrede Railroad operated through the 1990s. In 2000, the West Carbon Mine and loadout was constructed above Winifrede, which renewed operations on the railroad. Owned by



Depicts the potential of ballast degradation that the GPR can be used to detect.

the Kanawha Eagle Coal Company and renamed the Big Eagle Railroad, its rail-to-barge operations resumed until they were discontinued in 2013. The line connects with an interchange with CSX near Chesapeake. Energy Transfer is providing access to this rail at no charge to the university.

The research team also has web-based GIS information portals under development as part of the project. The portals will be used to display the group's findings and assist in the analyses and subsequent developments of the final inspection platform that will also incorporate state-of-the-art GPS.

"We're in the convergence stage now after years of research with support from the government and the railroad industry," Begley said. "We started this work in 2001 and resumed it recently.

The railroad industry has been very supportive, and we are thankful to the MU administration that has helped to restore our research funding. When we are finished, we will have an integrated multi sensor system with a graphical user interface that can give information into potential problems that can be investigated and corrected long before there's an accident. It's also a wonderful opportunity to expose our engineering students to technology which will help them in their career as well."

Dr. Greg Michaelson, observes senior civil engineering major Elisabeth Roberts as she operates the ground penetrating radar instrumentation (GPR).

MU Hi-rail currently being equipped with GPR instrumentation for testing on the rail lines.

Marshall University Subterranean Testing Facility

By James Bryce

There exist many scenarios in which knowing the features below the surface of the earth is critical for the safety of military and civilian personnel. For example, military operations in locations where knowledge of tunnels is incomplete can pose a significant risk to the safety of soldiers. As another example, civilian rescue operations can significantly benefit from technologies to map voids beneath the surface in a disaster zone – this could mean the difference between finding survivors or not. In addition to safety risks, illicit tunneling along the borders of countries represents a major socio-political challenge.

The most reliable way to map subterranean features is to excavate the area of concern and physically inspect it. However, that is not a feasible or practical solution in most cases. Therefore, scientists and engineers must rely on non-destructive technologies, such as Ground Penetrating Radar (GPR) and analysis of seismic wave propagation, to reliably and accurately map subterranean features. To this end, researchers in the College of Engineering and Computer Sciences are working on research sponsored by the U.S. Army Corps of Engineers to develop technologies, approaches, and algorithms for mapping the subterranean environment at significant depths (up to 30 feet below the surface) in challenging environments. The team, which is led by Dr. James Bryce, Dr. Arka Chattopadhyay and Dr. Suk Joon Na from Civil Engineering, and Dr. Mehdi Esmaeilpour of Mechanical Engineering, is working to address many gaps and challenges associated with using the technologies to map subterranean features.

One of the key challenges that the Corps of Engineers has documented is the lack of accessible tunnels and subterranean features that are representative of actual tunnels or voids found in realistic scenarios. While an ample number of subterranean features exist in urban environments (e.g., sewage lines, etc.), these are not representative of voids that are constructed using tunneling techniques and are generally fairly shallow in depth. Furthermore, if the voids represent illicit tunnels with human activity, there is a chance that certain signatures of that activity can be detected using some technologies.

To meet these challenges, the research team is currently in the process of designing a subterranean testing facility that will be a first of its kind in the U.S. The facility will include multiple tunnels constructed in specific dimensions and in different soil and rock types that will allow the research team to capture the signatures of tunnel construction activities and develop new non-destructive technologies to identify the tunnels and voids after their completion. Portions of the tunnels will be constructed in environments that exceed the capabilities of current non-destructive technologies, which will facilitate advances in theory and technologies.

Several other features at the facility are being constructed to perform specific experiments. For example, the research team is constructing a small-scale test pit to be used to directly compare results from multiple technologies in a more controlled setting. This will allow the researchers to efficiently change soil types and layers to perform the same experiments while being able to vary soil types, tunnel materials, soil layers and objects placed between the soil and void.

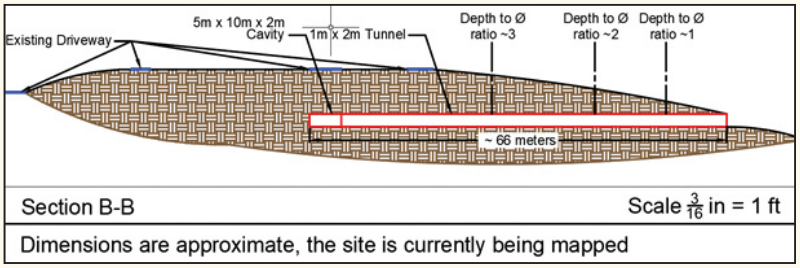


Figure 4 – Example of a Tunnel Designed into an Existing Hillside

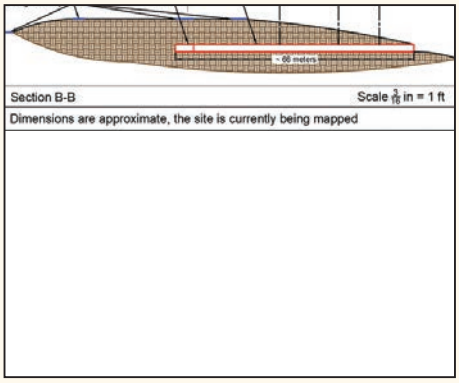


Figure 5. Example of Controlled Test Pit Layout

Another critical aspect of this testing facility is the numerical simulation. Researchers are currently working to build state-of-the-art simulations to computationally evaluate the features being constructed. Several advances have already been made by the research team in the field of numerical simulation and modeling as a result of designing the experiments.

Currently, the research team is finalizing the design on the first tunnel with a goal of construction occurring in the upcoming summer. Additional tunnels and features will be constructed over the next several years. Once constructed, the facility will be unique in the U.S. and will offer the opportunity for training and research.

FEMA Recognizes Civil Engineering Flood Mitigation Project

By Richard Begley

The Fall 2020 FEMA regional newsletter cited the work of the Civil Engineering faculty and students for a flood study recently conducted for a flood prone community in Southern WV.

https://content.govdelivery.com/accounts/USDHSFEMA/bulletins/2a0f9a2

"This was the first recognition by FEMA of Marshall University for flood analyses in the history of the program," according to Professor Begley.

Marshall University and FEMA Help Develop a Flood Mitigation Program for Rainelle, West Virginia

FEMA is working with Marshall University to support a flood mitigation project in Rainelle, West Virginia. A FEMA grant to fund the project was awarded through the Hazard Mitigation Grant Program (HMGP) in response to the June 2016 Presidential Major Disaster Declaration. In Rainelle, the 2016 flooding resulted in loss of life and caused significant property damage.

The project is a long-term study and examination of the infrastructure modifications needed to convey water safely from a drainage basin to the Meadow River. The study is being led by Dr. Richard Begley, Professor of Engineering at Marshall University, and several of his students. They have worked extensively to model simulations and produce flood inundation maps that will be used in future decision-making and planning processes to alleviate flooding. Dr. Begley has performed computer modeling to help design a long-term solution for preventing flooding in the City of Rainelle. He has led a team of civil engineering students to study the subject and present their capstone project detailing a few options for installing a stormwater management system for a portion of the city. Stay tuned for more updates about this exciting project and partnership.

Wayne Brown, who is with the Western Greenbrier Business Development Corporation (WGBD) and assisted in the grant application to HMGP in 2017, said: "Marshall University has provided excellent computer-based flood simulations for us since 2004, and essentially they performed a flood simulation in 2004, that unfortunately came true in 2016." We used the results of their flood simulations in the grant application that we made to FEMA. "We are very appreciative of the engineering expertise that Marshall University has provided and continues to provide." He said, "The historic flood in 2016 wreaked havoc in this small community resulting in the loss of five lives, and over 100 homes. The city has also been prone to flooding with significant flooding events in 2003 and 2011, and is still in FEMA designated recovery from the 2016 event."

The Marshall study began as a result of a smaller flooding event in 2003, when a team of graduate students collected precise elevations of the city streets in addition to the two streams that traverse through the city and their respective bridges. This data was then compiled and used to perform flood simulations. "The simulations suggested that the clearance of one of the bridges was too low, and had the potential to increase the extent of flooding in the city from larger precipitation events," according to Dr. Begley.

Shortly after the flood of 2016, in which Rainelle received over 7.6 inches of rain in a 36 hour time period, another graduate student secured a video captured by a drone on the day of the flood. He then compared the flood simulations performed in 2004 with the extent of the 2016 flood. The perimeter of the flood predicted by the simulation performed in 2004 was nearly identical with the perimeter of the 2016 flood.

Last May, a team of civil engineering students selected this case study and used it for their capstone project to design a new storm water management system for the city. The local TV station interviewed part of the student team as part of their "Fighting Future Flood" docuseries in May 2020.

An Image from the online interview is shown above. Above right in descending order. Professor Begley, Alex Toler and James Dishner BSE graduates May 2020, and WOWK Senior Meteorologist Spencer Adkins. **www.wowktv.com/weather/fighting-future-floods-marshall-university-students-and-professor-work-to-reduce-flood-risks-in-rainelle-west-virginia**

Alex is from Logan, WV, and James is from Princeton, WV. Both of the graduates received full time job offers upon graduation. Alex Toler is continuing the flood study work while going to graduate school part time for the MU Master of Science in Engineering degree. He is also working full time for the United States Army Corps of Engineers as a Civil Engineer in the Hydraulics and Hydrology section in Huntington, WV.

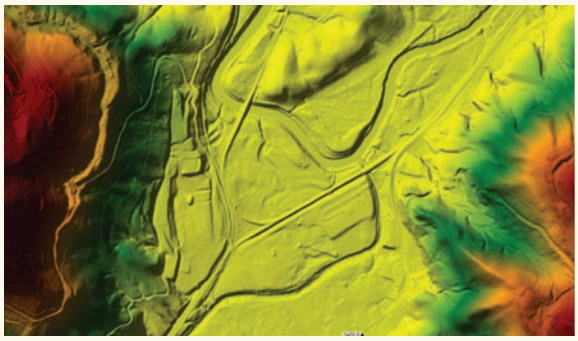
Rainelle is located in Western Greenbrier County along the Midland Trail National Scenic Byway and nearby the banks of the low sloping and normally low flowing Meadow River. The city, with a population of less than 1,600, is nestled in the lowlands between several steep mountains. The two streams that traverse the city pass under 4 roadway bridges before converging on the northern edge of the city limits. At this location, Little Sewell Creek terminates into Sewell Creek and the final segment of Sewell Creek must also flow under a railway bridge right before it reaches the river. And this was the bridge identified with inadequate clearance during the 2004 flood simulations

Furthermore, the Meadow River-Sewell Creek confluence point occurs immediately before a segment of the Meadow River that is highly resistive to flow. This segment of the Meadow River has three 90 degree turns crowded into only ½ mile of the river's length. When the three 90 degree turns of the river are combined with an additional 90 degree turn present at the Sewell Creek-Meadow River intersection, the result is that the drainage from 25,000 + acres of the mountainous terrain has to navigate four 90 degree turns in less than ½ mile. These waters also have to flow under an additional railway bridge that is located in between the 1st and 2nd 90 degree turns in the river. And over 150 years ago, the local developers of the region recognized that this location was favorable for a dam that was never built.

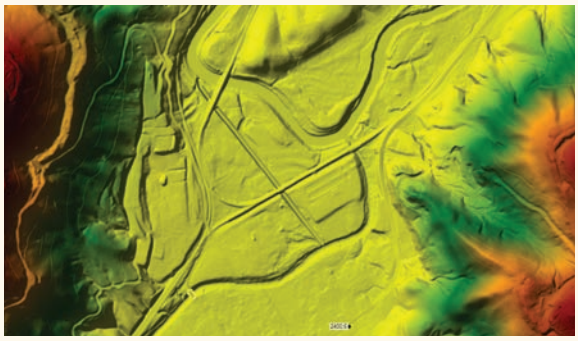
"It appears that the capacity of the river to accommodate the influx of water from the Sewell Creek watershed is limited due to the congestion of the three bends and the low slope of the river. Rainelle is also located in a region that has a fairly shallow groundwater table; and, the highest recharge rates for groundwater in the state of WV. All of these issues will require significant attention for a long-term flood prevention strategy," according to Professor Begley.

Alex is using state of the art tools to perform the modeling as shown below. He first had to acquire the digital elevation models produced from LIDAR data collected by FEMA after the 2016 flood event. He had to modify the terrain to suit the current and proposed conditions including adding bridges that were not present in the original data and a proposed flood water relief channel. He can then run flood simulations to test the results of the terrain modifications while also using high water marks recorded during the 2016 flood to calibrate the flood modeling tools and processes. It is a very meticulous process to simulate reality and Alex is doing a superb job.

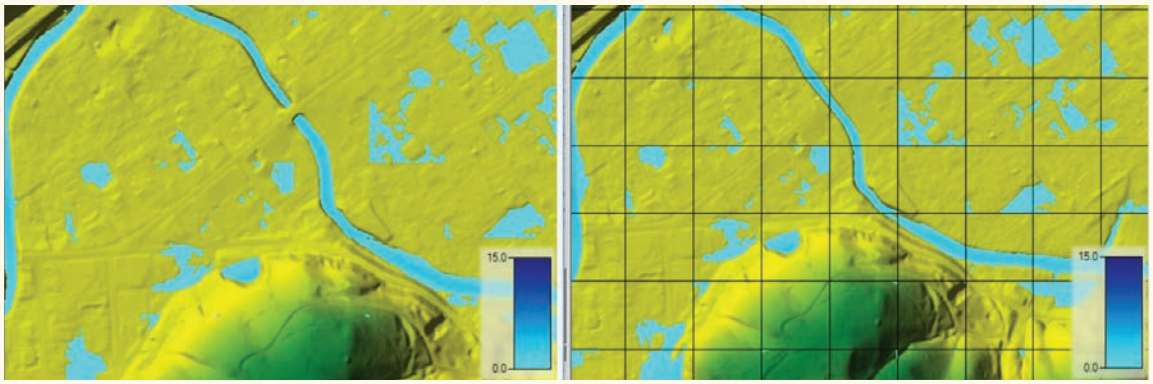
The process for using capstone projects at the universities to assist other communities in WV that experience recurring flooding yet are unable to fund the studies needed to understand and better manage their risk has been adopted by the U.S. Army Corps of Engineers Pittsburgh District. This will be part of the FY22 Silver Jackets program as currently proposed.



Shows the original terrain produced from the FEMA data.



Shows the modified terrain with the proposed flood relief channel.

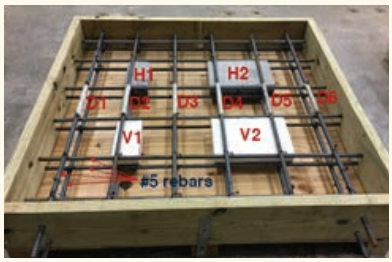


Shows the results of a simulated precipitation event before(Right) and after a bridge was added (Left) to the original FEMA terrain data.

Non-destructive Testing and Evaluation of Reinforced Concrete Transportation Infrastructure

By Wael Zatar

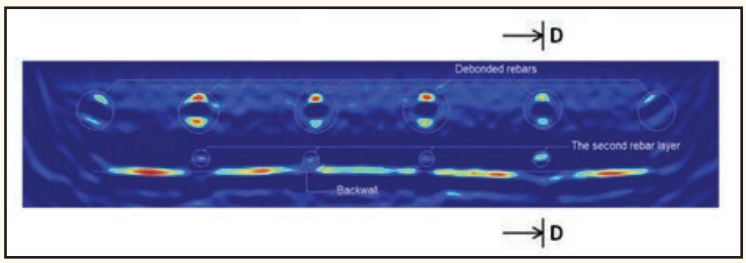
The American Society of Civil Engineers produced the nation's report card for its infrastructure assets in 2017. The report card showed a grade of D+, which represents "poor" to "fair" condition for the nation's infrastructure. Categories such as bridges, roads, railroads, dams and levees, transit, energy, and aviation were included in the infrastructure report card. This rating poses a serious concern as a large portion of the nation's infrastructure exhibited significant level of deterioration that imposes serious safety risks. Approximately 40 percent of the bridges in the United States were built more than 50 years ago. Proper inspection, maintenance, rehabilitation, or replacement of these bridges play a critical role in the nation's economy. In 2016, about 9.1 percent of the nation's bridges were classified as structurally deficient and 13.6 percent were functionally obsolete. The federal government estimated that $123 billion is needed to address the nation's bridge rehabilitation projects' backlog. Dr. Wael Zatar led the research team that focused on transportation infrastructure asset management at Marshall University for the past 17 years. The research team has successfully conducted numerous studies to produce innovative solutions to enhance the safety of the nation's aging infrastructure. The support provided by the United States Department of Transportation, Federal Highway Administration, and West Virginia Division of Highways played a significant role in the successful completion of these efforts.



Reinforced concrete slab with artificial voids, debonding and honeycomb.

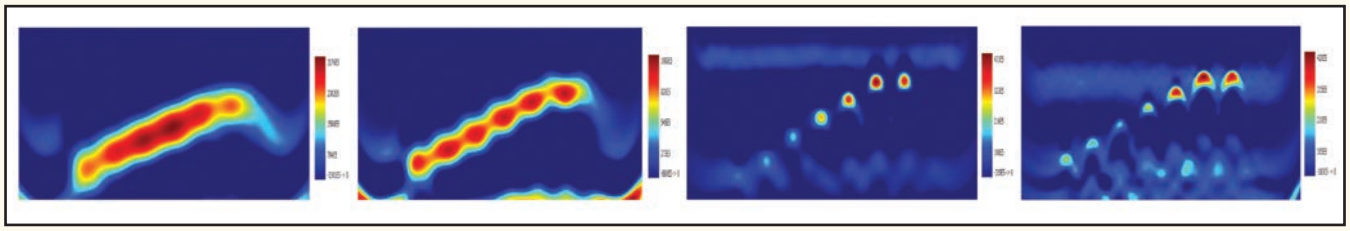
Front panel of UPC device.

The research team conducted a recent study that aimed at evaluating reinforced concrete bridge elements using ultrasonic pitch and catch (UPC) non-destructive testing (NDT) technique. Validation reinforced concrete slabs with two embedded layers of rebars and artificial defects such as voids, honeycomb, and debonding were designed and tested. A commercial UPC NDT device was used to map internal defects of the validation slabs. The UPC NDT is based on the ultrasonic shear-wave test method using dry-point-contact transmitting and receiving transducers in a "pitch-catch" configuration. The recorded data from the UPC device was analyzed using a modified synthetic aperture focusing technique. The research team developed a software to reconstruct 2-D and 3-D images of the reinforced concrete slabs using novel signal filtering and processing techniques. The reconstructed 2-D and 3-D images accurately identified the location of steel rebars, voids, and debonding. The developed software has been proven to produce a much higher resolution of the anomalies as compared to the UPC device's proprietary imaging software.



2-D Reconstructed image at the location of artificial defects.

Reconstructed Images of the Sample Bridge Deck Slab Specimen.



NSF S-STEM Grant

By Wook-Sung Yoo

Dr. Wook-Sung Yoo (PI) and his team from the College of Engineering and Computer Sciences at Marshall University received a $990,550 scholarship grant in Science, Technology, Engineering and Mathematics (STEM) from the National Science Foundation (NSF) in Aug. 2020. The grant provides $7,500 per year for 20 academically talented, financially disadvantaged students, to cover financial need and help them develop technical and professional skills through real-world project experiences under faculty mentorship. The college has put an emphasis on encouraging more high school students from the region to study STEM fields at Marshall and this grant will hopefully help attract many talented students to join the College of Engineering and Computer Sciences programs. The funding supports a project-based work studio to provide undergraduate students with real-world projects in the studio environment and professional development for five years to achieve success in their careers and the first cohort with ten students were selected with seven female recipients starting in Fall 2021.

The names and majors of the students selected are:

Women

- **Chloe Duckworth**, Computer Science or Biomedical Engineering, Flat Top, WV
- **Alexa Hoffman**, Electrical and Computer Engineering or Mechanical Engineering, Ona, WV
- **Muna Lentison**, Computer Science, Poca, WV
- **Olivia Maynor**, Mechanical Engineering, Ona, WV
- **Eve Mohr**, Biomedical Engineering, Normantown, WV
- **Jade Sedeyn**, Mechanical Engineering, Gallipolis, OH
- **Jada Stutts**, Biomedical Engineering, Peterstown, WV

Men

- **Cameron Green**, Computer Science, Cypress, TX
- **Neil Loftus**, Computer Science, Huntington, WV
- **Hadden Mick**, Computer Science, Marlington, WV

GenCyber: A Camp for Teachers on Cyber Security

By Husnu Narman

Marshall University's GenCyber program provides summer cybersecurity and cyber forensics camp experiences for both students and teachers at the K-12 level. The goals of the program are to increase interest in cybersecurity careers and diversity in the cybersecurity workforce of the nation, help all students understand correct and safe online behavior and how they can be good digital citizens, and improve teaching methods for the delivery of cybersecurity content in K-12 curricula.

Our vision is for the GenCyber program to be part of the solution to the nation's shortfall of skilled cybersecurity and digital forensics professionals. Ensuring that enough young people are inspired to direct their talents in this area is critical to the future of our country's national and economic security as we become even more reliant on cyber-based technology in every aspect of our daily lives.

Marshall University's GenCyber Camp was the 1st GenCyber program for students and teachers of West Virginia and the surrounding Appalachian regions. The foundation courses cover basic cybersecurity concepts, ethics, and online safety. To ensure a level playing field, applications to the Marshall GenCyber camps are open to all student participants at no cost on a competitive basis. Funding is provided jointly by the National Security Agency and the National Science Foundation.

2021 Spring Festival

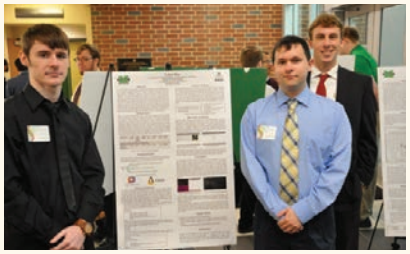
By Dave Dampier

On April 10, the College of Engineering and Computer Sciences celebrated its first annual Spring Festival in the J. Churchill Hodges Atrium of the Weisberg Applied Engineering Complex. Approximately 30 families participated in the event, and a great time was had by all. Children were happily playing and searching for candy. Parents were getting to know one another. Faculty and staff were relaxing in a non-work environment in a way that has been so needed during the last year. All was done in a socially distant, safe way, so that we would not get one another sick.

We are planning to have another one of these events in the Fall, probably right before Thanksgiving, and hopefully, we will be able to invite students and alumni as well to join in the fun.

Computer Science Symposium on Emerging Technologies (CSSET)

By Cong Pu



The Computer Science Symposium on Emerging Technologies (CSSET) 2021 is a university-wide annual event and aims at bringing the professors, researchers, and students together in the fields of computer science, information systems, and cyber security to disseminate original research results, and share new ideas and emerging technologies through practical development experience concentrating on both theory and practices. CSSET is also held to allow industry and government recruiters to reach out to computer science and computer & information security students at Marshall University for their hiring needs during busy seasons and to secure future talent with internships.

Award Winners

Three winners with cash award by Strictly Business:

- 1st Place Award: "Crowdsourcing Infrastructure Management System" Presented by Eric Shoemaker
- 2nd Place Award: "Heavy Lift Delivery Drone with OpenCV Object Avoidance" Presented by Thomas Williams, Pete Mills, Caleb Johnson, Bailey Protzman
- 3rd Place Award: "Health Condition Monitoring System" Presented by Evan Allen, Craig Bowe, Brian Farley, Nick Herrmann, Asbury Dillan

Testimonials

"This was my first time participating in the symposium, and this experience was invaluable to me as I move forward with my research project. The symposium not only allowed me to present my hard work to others, but it also allowed a medium to receive wonderful and thought-provoking feedback from the judges and suggestions that I will be considering in future versions of my project." By Eric Shoemaker.

"I was impressed and interested by the work the students did under the guidance of the Computer Science faculty. The students performed well through all stages of their projects, from having innovative topics, researching, creating computer programs to collect and analyze data, through to the presentation stages. I learned a lot myself!" By Mollie McOwen

Community Service Leadership Program (CSLP)

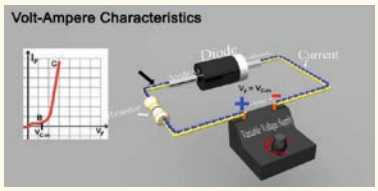
By Husnu Narman

…Student Team to Promote STEM Education…

Community Service Leadership Program (CSLP) in the College of Engineering and Computer Sciences at Marshall University provides an opportunity for some selected Marshall students to develop leadership skills and professionalism and promote computing and engineering education in the community.

The CSLP has been an integral part of the extra-curricular activities of the Computer Sciences and Electrical Engineering Department. The students in CSLP have been engaged in various activities such as mentoring middle and high school students for VEX Robotics, hosting computing workshops for K-12 students, supporting CS A-Z Sumer Camp, Cybersecurity Camps, and other fun activities. To continue computing education during the COVID 19 pandemic, the CSLP created remote computing sessions using Google Classrooms and e-conferencing tools (Zoom or Teams) to provide various hands-on STEM activities for high school students, as shown below:

Title: Pixel Art Using Python
Aims: Understand the bitmap method, one of the ways computers express graphics and pictures, and experience programming using a simple programming language, Python.
Requirements: Computer, Internet, Browser, Gmail/Email Account
Grade: 8 – 12



Title: Circuit Simulation
Aims: Create a simple battery and resistor circuit, understand the relationship between current, voltage, and resistance, Learn the difference between parallel and series circuits.
Requirements: Computer, Internet, Browser, Adobe Flash Player, Gmail/Email Account
Grade: 8 – 12 (AP Physics)

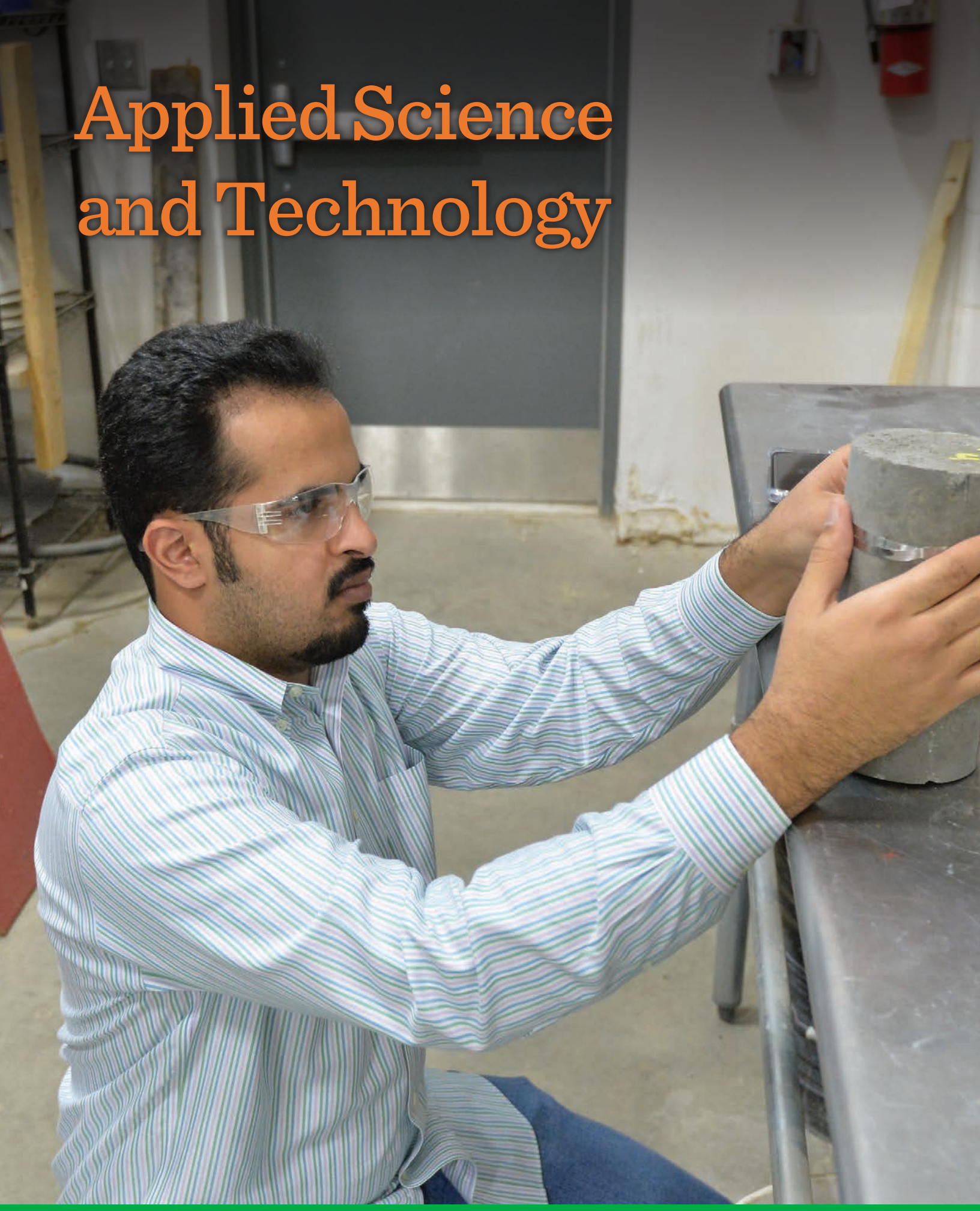
Title: Basics of Power Transfer
Aims: Introduce the power transferring process from a generation plant to the consumer, show how losses occur during transmission, and create a simple model.
Requirements: Computer, Internet, Browser, PowerWorld Simulator (optional) to create a simulation, Gmail/Email Account
Grade: 9 – 12

Title: Scratch Gam
Aims: To introduce programming syntax using block coding and Scratch with block coding style to students, develop a simple and fun racing game.
Requirements: Computer, Internet, Browser, Gmail/Email Account
Grade: 3 – 8

Title: Mobile App with App Inventor
Aims: To introduce programming syntax using block coding and mobile application with block coding style to students, develop a simple mobile application for Android
Requirements: Computer, Internet, Browser, Android Mobile Phone, Gmail/Email Account
Grade: 6 – 12

CSLP welcomes all local K-12 schools and arranges a remote hands-on session for K-12 students working with K-12 educator.

Applied Science and Technology



Faculty Members

Dr. Tracy Christofero is a Professor of Technology Management. She received her Ph.D. in Information Science from Nova Southeastern University, her M.S. in Education from Indiana University, her B.S. in Public Administration from Indiana University, and her A.S. in Criminal Justice from Lake Michigan College. She is from St. Joseph, Michigan, but now resides in Charleston, WV. Her research interests include project management, distance learning, and accessibility. Her personal Interests include the training and use of therapy dogs for college students under stress. During the pandemic, she worked with a non-profit organization and hosted virtual therapy dog visits for nursing home residents throughout the United States.

Dr. Christofero is the Program Coordinator for the Technology Management graduate degree program in the college. She teaches management of innovation and technology, IT strategies and strategic planning, quality and productivity methods, project management, and information security courses. She was a recipient of the Outstanding Graduate Advisor award and led an interdisciplinary team earning the Hedrick Program Grant Award for Teaching Innovation. Dr. Christofero served on Graduate Council for 11 years, 8 of which she was chair. She additionally served on Faculty Senate for 11 years, 9 of which she served on the Executive Committee. During her tenure at Marshall, Dr. Christofero chaired or served on 50+ university, college, department, and community committees.

Publications

- Christofero, T., L. Howard, and R. McKinney, "MU ACCESS: Accessibility Curricula Collaboration fostering Employable Student Skills," Proceedings of the Appalachian Regional Business Symposium, 2021.
- Howard, L., T. Christofero, and R. McKinney, "Employment Challenges for People with Disabilities in Appalachia: A Community Approach," Proceedings of the Appalachian Regional Business Symposium, 2021.

Dr. Jian Liu is an Associate Professor of Applied Science and Technology. He received his Ph.D. in Industrial Engineering (Ergonomics) from Virginia Tech, his M.S. in Industrial Engineering from Virginia Tech, and his B.S. in Industrial Engineering from ShangHai Jiao Tong University. Born in YanTai City, China, Dr. Liu now resides in Huntington, WV. His research interests include physical ergonomics; musculoskeletal biomechanics; and fall prevention. His personal Interests include traveling, classical music, and reading.

Research and/or Teacher Highlights

- Certified Professional Ergonomist (CPE, #1619) from Board of Certification in Professional Ergonomics.

James McIntosh currently serves as Professor and Chair of the Department of Applied Science and Technology. He received his M.S.E. in Industrial Engineering (Occupational Safety & Health) from West Virginia University; Born in Fairmont, WV, he now resides in Charleston, WV. His research interests include respiratory protection and behavioral safety programs. His personal interests include family, hunting, fishing and tennis. He was inducted to the Academy of Distinguished Teachers in the College of Engineering and Computer Sciences.

Research and/or Teaching Highlights – Mr. McIntosh has been at Marshall since 2005 teaching undergraduate and graduate level courses in occupational safety and industrial hygiene. He has over 30 years of experience working in industry, government, and consulting. He is certified in the Comprehensive Practice of Industrial Hygiene and Safety. During his career he has held a variety of leadership roles managing safety, IH and the environment. He has also consulted to a wide range of industries and businesses on safety and industrial hygiene issues.

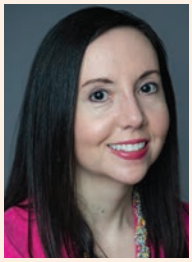
Research Grants

- McIntosh, James D (Principal), "Safety/IH Program Development," Sponsored by ENCOVA Insurance, Marshall University, $150,000.00. (July 1, 2015 - Present).
- McIntosh, James D (Co-Principal), Zatar, Wael Abd Elhalim M (Co-Principal), "Evaluation of the Safety Culture at the WVDOH," Sponsored by WV DOH, State, $208,000.00. (October 1, 2015 - Present).
- McIntosh, James D (Project Manager), "Host Site- Safety & Health Training," Sponsored by WVU, Marshall University, $125,000.00. (September 30, 2012 - Present).

Dr. Scott Simonton is a Professor of Environmental Science. He has a Ph.D. in Engineering, from the University of New Mexico, an M.S. Environmental Engineering from Marshall University, and a B.S. in Civil Engineering from the West Virginia Institute of Technology. He is from Huntington, WV, but now resides in Charleston, WV. His research interests include forensic analysis of environmental impacts, human health risk, and environmental impacts related to mining. His personal interests include being an experienced private pilot and volunteer for Southwings, avid outdoorsman who includes backpacking, fly-fishing, flying as well as travelling throughout the American west with his family.

Research and/or Teaching Highlights

Dr. Simonton is Program Coordinator of the graduate Environmental Science Program in the College of Engineering and Computer Sciences at Marshall University, having joined the University in 2001. Dr. Simonton has been a practicing environmental professional in regulatory agencies, the private sector and academia since 1991. He has extensive experience in the fields of environmental science and engineering, as well as expertise in environmental law, policy and regulation. Dr. Simonton is a veteran of the United States Marine Corps and the United States Army.



Dr. Sarah Surber is an assistant professor in the department of Applied Science and Technology. She earned her Ph.D. in Public Health from the West Virginia University School of Public Health, Occupational & Environmental Health Sciences. She also earned a J.D. from the West Virginia University College of Law. She has an M.S. in Environmental Science and a B.A. in Political Science from Marshall University. She is originally from Cleveland, Ohio. Her research interests include occupational and environmental public health, environmental law, environmental justice, and community and workforce impacts from opioid and substance use disorders.

Publications

- Saunders, A., M. Linz, T. Collins, S. Surber, K. Aabel-Brown, S. Ghori, Foster Care, Kinship, and Adoptive Parents and Caregivers in WV, Marshall University Research Corporation, 2020.
- Saunders, A., S. Surber, T. Collins, K. Aabel-Brown, A. Plymale, A Framework for Rural Communities to Address Substance Use in Their Communities, poster, Rx Drug Abuse & Heroin Summit Annual Meeting, 2021.
- Surber, S., "OSHA Enforcement to Protect Health Care Workers from Violence," American Journal of Public Health, 111(5): 829-831 (2021).
- Surber, S., "A Conceptual Model for Integrating Community Health in Managing Remediation of West Virginia and Central Appalachia's Abandoned Coal Mines," Environment, Development, & Sustainability, 23: 1563-1578, 2021.
- Surber, S., D. Simonton, "Rural Neurologic Health and Coal Truck Traffic," National Rural Health Association Annual Meeting, poster, 2021.

Research Grants

- Surber, S., Substance Abuse and Mental Health Services Administration (SAMHSA) grant ($2.5 million), Recovery, Treatment, and Workforce Support, Co-Principal Investigator and Evaluation Team Researcher for Marshall University
- Surber, S., West Virginia Higher Education Policy Commission (WVHEPC) grant ($1,000), Developing and Utilizing Open Educational Resources Materials, Principal Investigator
- Surber, S., West Virginia Foster, Adoptive and Kinship Care Network and West Virginia Department of Health and Human Resources (WVDHHR), Survey for Kinship, Foster Care, and Adoptive Parents, Researcher (completed 2021)
- Surber, S., Health Resources and Services Administration (HRSA) Rural Communities Opioid Response Program (R-CORP) planning grant ($200,000), Appalachian Rural Opioid Consortium, Researcher (completed 2020)
- Yoo, W., Wahjudi, P., Dampier, D., Surber, S., Cartwright, T., NSF S-STEM: Scholarships and a Project-based Work Studio to Support Undergraduate Student Graduation and Entry into Computer Science, Engineering, and Safety Technology Careers, Co-PI, $990,550, 10/2020 – 9/2025

Dr. Anthony Szwilski, Professor and Director, CEGAS – Education: Executive MBA, Xavier University, Cincinnati, Ph.D. Geomechanics, Nottingham University, United Kingdon, BSc (Honors), Mining Engineering, Nottingham University, United Kingdom. Hometown: Staffordshire, England. Research Interests: Materials Technology, Visualization/Simulation, Safety Training Technology, Geotechnology, Geomechanics. Personal Interests: Travelling and ballroom dancing.

Research Grants

- Szwilski, A., 'Sub-pilot-scale Production of High-Value Products from U.S. Coals', Dept. Energy $1.9 million. Collaborating with Universities of Utah and Wyoming.
- Szwilski, A., 2019-2021 Co-Principal Investigator: 'Assessment of Rail Systems Structural Adequacy in Military Theaters Using Nondestructive Testing and Structural Monitoring Capabilities', U.S. Army Engineer Research and Development Center, $999,785.
- Szwilski, A., 2015-2020 Co-Investigator: RII Track 1- Appalachian Freshwater Initiative, WVEPSCoR-NSF. rating institutions: West Virginia University, Marshall University, West Virginia State University. RII Track 1: Gravitational Waves and Appalachian Initiative. Total project funding $20 million.

Dr. Xuanxuan "Avery" Zhang, Assistant Professor – Education: PhD in Industrial and System Engineering. Hometown: Beijing, China. Research Interests: Wearable Exposure Risk Assessment, Human Factor and Ergonomics, Occupational Injury Prevention. Personal Interests: Basketball, movies, oil on canvas art, guitar.

Publications

- Schall, M., X. Zhang, H. Chen, S. Gallagher, N. Fethke, "Comparing upper arm and trunk kinematics between manufacturing workers performing predominantly cyclic and non-cyclic work tasks," Applied Ergonomics. 93 (2021) 103356.

Staff Members

Dawn Rayburn — Administrative Secretary Sr. - Education: Bachelor's Degree in Accounting from Strayer University, Associates Degree in Applied Business from Daymar College. Hometown: Wheelersburg, Ohio. Interests: Camping, cross-stitch, traveling, exploring, and an animal person.

Advisory Board Members

- **Austin Brislin**, Manager-USGO Safety, TC Energy
- **Brian Browning**, Health and Safety Supervisor, Volvo
- **Prentice Cline Jr.**, Area Director, OSHA Charleston Area Office
- **Alicia Cunningham**, Senior Safety & Loss Control Consultant, Encova Insurance
- **Kurt Dailey**, EHS Director, ICL-IP America, Inc.
- **Chris Devoss**, SHE Specialist/Contractor, IFF
- **Eric Fyre**, Cipriani and Werner
- **Greg Gibson**, Safety Supervisor, Marathon Petroleum
- **Mike Granata**, Director of Safety and Health, American Electric Power
- **Nate Henderson**, Champion Industries
- **Kevin Kemmerer**, President, Precision Pump and Valve Service, Inc.
- **John Opperman**, Safety Director, Blackhawk Mining LLC.
- **David Stacy**, USI Insurance
- **Toney Stroud**, Encova Insurance
- **Chris Veazey**, HSE Manager, OWS

Student Chapter

Marshall University Student Chapter of the Association Society of Safety Professionals

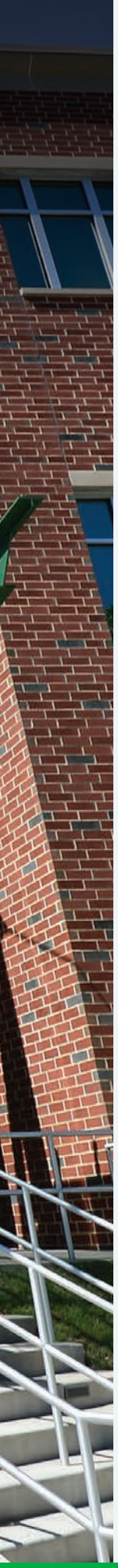
Due to the COVID Pandemic limited activities were undertaken in 2020-2021. The following is a highlight of the activities:

- Hosted a meeting with professional members and guest speaker from the Occupational Safety and Health Administration (OSHA)outreach office to discuss common violations observed and cited during OSHA inspections in the WV region.
- Virtually met during the pandemic to play safety Jeopardy and discuss matters of the organization. Members were also invited to several virtual meetings and conferences.
- Organization elected new offices, who then drafted and received approval from the national organization on its charter and by-laws.
- Chapter is active and participates with the WV Professional Chapter as well as student chapters from Fairmont State University and West Virginia University.

Marshall S.C. OSHA Training Host Site

The department manages a "Host Training Site" through an agreement with WVU Safety and Health extension's OSHA Education & Training Institute. OSHA training courses are offered monthly at Marshall's South Charleston Campus. This project has given students opportunities to participate in local training with industry professionals. The project has also given the faculty an opportunity to teach as well as learn from local professionals. The Training has been offered to the public as well as to individual corporations since 2013.

Biomedical Engineering



Faculty Members

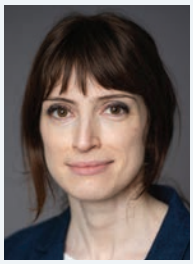
Dr. David A. "Dave" Dampier currently serves as Professor, Interim Dean of the College of Engineering and Computer Sciences at Marshall, and Interim Chair of Biomedical Engineering. Prior to this, he served as Associate Dean for Research in the college. He has an M.S. and Ph.D. in Computer Science from the U.S. Naval Postgraduate School in Monterey, CA, and a B.S. in Mathematics from the University of Texas at El Paso. He grew up in Florida and now lives "out" Wayne, WV. His research interests are Cyber Security, Digital Forensics, and Software Engineering. His personal interests are family, especially his 5 grandchildren, woodworking, and Taekwondo.

Publications

- Al-Dhaqm, A., S. Ruzak, D. Dampier, K. Choo, K. Siddique, R. Ikuesan, and A. Alqarni, "Categorization and Organization of Database Forensic Investigation Processes," IEEE Access, June 2020.

Research Grants

- Narman, H., Dampier, D., PI: 2020 GenCyber Teacher Summer Camp (NSA/NSF, $72,992.62)
- Yoo, W., Wahjudi, P., Dampier, D., Surber, S., Cartwright, T., NSF S-STEM: Scholarships and a Project-based Work Studio to Support Undergraduate Student Graduation and Entry into Computer Science, Engineering, and Safety Technology Careers, Co-PI, $990,550, 10/2020 – 9/2025



Dr. Nasim Nosoudi is an assistant professor in the Weisberg Division of Biomedical Engineering at Marshall University. She holds a bachelor's degree in Material Engineering. She has completed her master's degree in Biomedcial engineering with a focus on bone tissue engineering. She received her Ph.D. in Bio-Engineering with a focus on Nanomedicine from Clemson University. She is interested in developing nanomedicine for cardiovascular diseases and reprogramming cells using electrospinning. Her teaching experience includes Tissue engineering, Nanomedicine, Biomechanics, Biotransport, Advanced biofluid, and Biomaterials.

Publications

- Chowdhury, A., N. Nosoudi, S. Karamched, V. Parasaram, and N. Vyavahare, "Polyphenol treatments increase elastin and collagen deposition by human dermal fibroblasts; Implications to improve skin health," Journal of Dermatological Science (2021 Mar 16).
- Nosoudi, N. et al. "Electrospinning Live Cells Using Gelatin and Pullulan." Bioengineering 7.1: 21, 2020.
- Sanaei, K., S. Plotner, A. Jacob, J. Ramirez-Vick, N. Vyavahare, and N. Nosoudi, "Effect of all-trans retinoic acid and pentagalloyl glucose on smooth muscle cell elastogenesis." Bio-Medical Materials and Engineering Preprint (2021): 1-13.
- Zadeh, A., D. Taylor, M. Bertsos, T. Tillman, N. Nosoudi, and S. Bruce. "Predicting Sports Injuries with Wearable Technology and Data Analysis." Information Systems Frontiers, 2020, pp. 1-15.
- Zadeh, A., Q. Alsabi, J. Ramirez-Vick, and N. Nosoudi. "Characterizing Basal-like Triple Negative Breast Cancer using Gene Expression Analysis: A Data Mining Approach." Expert Systems with Applications, 2020.
- Zohora, F., A. Aldebs, N Nosoudi, S. Singh, and J. Ramirez-Vick, "Gene Expression Profiling of Human Adipose Tissue Stem Cells during 2D versus 3D Adipogenesis." Cells Tissues Organs 208, no. 3-4 (2020): 113-133.
- Zohora, F., N. Nosoudi, S. Karamched, and N. Vyavahare, "The Role of Elastin Degradation in Vascular Calcification: Possibilities to Repair Elastin and Reverse Calcification." In Cardiovascular Calcification and Bone Mineralization, pp. 441-480.Book chapter, Humana, Cham, 2020.
- Aldebs, A., F. Zohora, N. Nosoudi, S. Singh, and J. Ramirez-Vick. "Effect of Pulsed Electromagnetic Fields on Human Mesenchymal Stem Cells Using 3D Magnetic Scaffolds." Bioelectromagnetics, 2020.

Patent

- Nasim Nosoudi and Marshall university 2021, Electrospun cell scaffolds and related methods, US patent No. 62/979,027, US

Dr. Joon "Simon" Shim is an Assistant Professor of Biomedical Engineering. He earned a Ph.D. in Biomedical Engineering from Mississippi State University, Starkville, MS and M.S. from Rensselaer Polytechnic Institute, NY. He was born in Seoul, Korea and now resides in Huntington, WV. His personal interests are that he is a dog lover (Cavapoo). His research interests include cellular biomechanics, angiogenesis, cerebrospinal fluid, and vascular endothelial growth factor in cardiovascular and neuroscience.

Publications

- Hochstetler A., H. Smith, D. Preston, M. Reed, P. Territo, J. Shim, D. Fulkerson, B. Blazer-Yost, "TRPV4 antagonists ameliorate ventriculomegaly in a rat model of hydrocephalus," Journal of Clinical Innovation Insight. 2020 Sep 17;5(18) (Impact Factor: 6.205)
- McKnight I., C. Hart, I. Park, J. Shim, "Genes causing congenital hydrocephalus: Their chromosomal characteristics of telomere proximity and DNA compositions," Experimental Neurology, January 2021. (Impact Factor: 4.691).

Research Grants

- Shim, S. and S. Lee, CECS Cross-disciplinary Research Facilitation Grant Program, Interdivisional Research Group Awards, 1/1/20-8/31/20.

Dr. Masudur "Masud" Rahman is an Assistant Professor of Biomedical Engineering. He earned a Ph.D. in LifeScience Engineering and M.Eng. in Material Science with a focus on anticancer drug development from the Toyohashi University of Technology, Japan. He did NSF Postdoctoral training at Marshall University. He has several years of industrial background in engineering the DNA for next-generation therapeutics. DNA nanotechnology is his research interest for the development of therapeutic and diagnostics applications. His teaching experience includes Nanomedicine, Medical Imaging, Biomaterial, Nanotechnology, and Nanochemistry. He loves to spend time on indoor plants and traveling. Rahman has published a U.S. patent, 23 journals, 48 conferences, and two book chapters.

Dr. Roozbeh "Ross" Salary is an Assistant Professor in both Mechanical Engineering and Biomedical Engineering. He received his Ph.D. in Industrial and Systems Engineering (Advanced Manufacturing) from State University of New York (SUNY) at Binghamton, NY, USA. He now resides in Huntington, WV. His research Interests include Biomedical Fabrication, Tissue Engineering, Regenerative Medicine, and Artificial Intelligence; Faculty Profile: **www.marshall.edu/cecs/faculty-profile-dr-roozbeh-ross-salary**.

Publications

- Chaffins, M., P. Yu, P. Claudio, J. Day, and R. Salary, "Investigation of the Functional Properties of Additively-Fabricated Triply Periodic Minimal Surface-Based Bone Scaffolds for the Treatment of Osseous Fractures," ASME Manufacturing Science and Engineering Conference (MSEC 2021), Cincinnati, OH, USA, June 21 - 25, 2021.
- Lawrence, L., J. Day, P.Claudio, R. Salary, "Investigation of the Regenerative Potential of Human Bone Marrow Stem Cell-Seeded Polycaprolactone Bone Scaffolds, Fabricated Using Pneumatic MicroExtrusion Process," Proceedings of the ASME Manufacturing Science and Engineering Conference (MSEC 2021), Paper Number: MSEC2021-63411, Cincinnati, OH, USA, June 21 - 25, 2021.
- Salary, R., J. Lombardi, D. Weerawarne, P. Rao, and M. Poliks, "A Computational Fluid Dynamics Investigation of Pneumatic Atomization, Aerosol Transport and Deposition in Aerosol Jet Printing Process," ASME Transactions, Journal of Journal of Micro and Nano-Manufacturing, Paper Number: JMNM-20-1007.
- Salary, R., J. Lombardi, D. Weerawarne, M. Tootooni, P. Rao, and M. Poliks, "A Sparse Representation Classification Approach for Near Real-Time, Physics-Based Functional Monitoring of Aerosol Jet-Fabricated Electronics," ASME Transactions, Journal of Manufacturing Science and Engineering, Paper No: MANU-18-1807, 142(8): 081007, August 2020.
- Weese, N., C. Rankin, D. Zhao, C. Hart, P. Quinlan, J. Day, and R. Salary, "Experimental Optimization of Polymer Jetting Additive Manufacturing Process Using Taguchi Design," ASME International Mechanical Engineering Congress & Exposition (IMECE 2020), Portland, OR, USA, November 16-19, 2020.
- Yeow, Y., M. Yu, J. Day, and R. Salary*, "A Computational Fluid Dynamics (CFD) Study of Material Flow in Pneumatic MicroExtrusion (PME) Additive Manufacturing Process," ASME International Mechanical Engineering Congress & Exposition (IMECE 2020), Paper Number: IMECE2020-24325, Portland, OR, USA, November 16-19, 2020.
- Yu, M., L. Lawrence, P. Claudio, J. Day, and R. Salary, "Pneumatic MicroExtrusion-Based Additive Biofabrication of Polycaprolactone Bone Scaffolds – Part II: Investigation of the Influence of Polymer Flow Parameters," ASME Manufacturing Science and Engineering Conference (MSEC 2021), Paper Number: MSEC2021-63412, Hosted by the University of Cincinnati, Cincinnati, OH, USA, June 21 - 25, 2021.

- Yu, M., Y. Yeow, L. Lawrence, P. Claudio, J. Day, and R. Salary, "Investigation of the Effects of Design and Process Parameters on the Mechanical Properties of Biodegradable Bone Scaffolds, Fabricated Using Pneumatic MicroExtrusion Process," ASME International Mechanical Engineering Congress & Exposition (IMECE 2020), Paper Number: IMECE2020-24252, Portland, OR, USA, November 16-19, 2020.
- Zhao, D., M. Yu, L. Lawrence, P. Claudio, J. Day, and R. Salary, "Investigation of the Influence of Consequential Design Parameters on the Mechanical Performance of Biodegradable Bone Scaffolds, Fabricated Using Pneumatic Micro-Extrusion Additive Manufacturing Process," ASME Manufacturing Science and Engineering Conference (MSEC 2020), Paper Number: MSEC2020-8512, Volume 1, V001T03A009, University of Cincinnati, Cincinnati, OH, USA, June 22-26, 2020. DOI: 10.1115/MSEC2020-8512.
- Zhao, D., C. Hart, N. Weese, C. Rankin, J. Kuzma, J. Day, and R. Salary, "Experimental and Computational Analysis of the Mechanical Properties of Biocompatible Bone Scaffolds, Fabricated Using Fused Deposition Modeling Additive Manufacturing Process," ASME Manufacturing Science and Engineering Conference (MSEC 2020), Paper Number: MSEC2020-8511, Volume 1, V001T03A008, University of Cincinnati, Cincinnati, OH, USA, June 22-26, 2020. DOI: 10.1115/MSEC2020-8511.

Staff Members

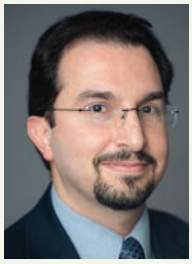
Leigh E. McDonald – Administrative Secretary, Senior. - Education: Associate of Arts in Liberal Arts from Butte Community College, Oroville, CA. Hometown: Proctorville, Ohio. Interests: Fiber and mixed media artist, printmaking, gardening, hiking, member of local area arts and fiber arts groups, dog lover (Beagle).

Advisory Board Members

- **Dr. Gregory Carico**, General Practitioner, Huntington Internal Medicine Group
- **Dr. Jim Day**, Head of Trauma Orthopedics, Cabell Huntington Hospital
- **Dr. Martine LaBerge**, Professor and Chair of Biomedical Engineering, Clemson University
- **Dr. Uma Sundaram**, Vice Dean of Research and Graduate Education, Marshall School of Medicine
- **Dr. James Warnock**, Professor and Chair of the School of Chemical, Materials, and Biomedical Engineering, University of Georgia
- **Kerry White**, Research and Development Lead, ALCON Huntington (Chair)

Civil Engineering

Faculty Members



Dr. Mohammad Alzarrad is an Assistant Professor in the Department of Civil Engineering at Marshall University. He graduated with dual bachelor's degrees in Civil Engineering and Business Administration from the University of South Alabama. He received his M.Sc. and Ph.D. in Civil Engineering from The University of Alabama. Before assuming his current position, he was an Assistant Professor in the Department of Civil Engineering and Construction at Bradley University. Prior to joining academia, Dr. Alzarrad was a Virtual Design & Construction (VDC) manager at an engineering design firm in Chicago, where he managed multi-million projects (i.e., Wrigley Field restoration and expansion project). Dr. Alzarrad's hometown is Barboursville, WV, and his research interests focus on Building Information Modeling (BIM), Artificial Intelligence, and Unmanned Aerial Systems (UAS) applications in construction.

Publications

- Alzarrad, M., "Fuzzy Monte Carlo Simulation to Optimize Resource Planning and Operations." Industrial Engineering: Gary Moynihan. InTechOpen, Rijeka, Croatia, 2020.
- Alzarrad, M., G. Moynihan, A. Parajuli, M. Mehra, "4D BIM Simulation Guideline for Construction Visualization and Analysis of Renovation Projects: A Case Study." Frontiers of Built Environment. 7(617031), 1-10, 2021.
- Alzarrad, M, M. Hatamleh, "A GIS-Based Artificial Neural Network Model to Assess Building Location Potential to Harvest Solar Energy." Proceedings of the ASCE Construction Research Congress 2020 Conference, Tempe, Arizona, 599-609, 2020.
- Elhouar, S., E. Hochscheid, M. Alzarrad, C., Emanuels, "Will Artificial Intelligence (AI) Take Over the Construction World: A Multidisciplinary Exploration." Proceedings of the 2020 Creative Construction e-Conference, Opatija, Croatia, 1-10, 2020.
- Hatamleh, M., G. Moynihan, M. Alzarrad, R. Batson, "Using the Project Management Maturity Models to Evaluate Organizational Implementation in Jordan." International Journal of Construction Project Management. 12(1), 17-31, 2020.

Dr. Richard Begley is originally from Oak Hill, WV. He received his undergraduate degree from West Virginia Institute of Technology in Montgomery WV, and his graduate degrees in Mining Engineering from West Virginia University in Morgantown, WV. He is currently a Professor in Civil Engineering with research experiences and interests in: Hydrological, Environmental, Transportation, and Geotechnical Engineering; Numerical Modeling; GIS/GPS/LIDAR, Remote Sensing Instrumentation; AC/DC Machine Controls and Automation, Explosives Engineering; and Dust Physics. He is the co-inventor for four (4) US and 1 Canadian Patent/s. He has served as PI or Co-PI on over three dozen grants or contracts since joining Marshall in 1990. His personal interests are primarily finding time to visit with, or golf with, his family members.

Dr. James Bryce is an Assistant Professor in the Department of Civil Engineering and the Assistant Director of the Appalachian Transportation Institute. He completed a Bachelor of Science in Civil Engineering at the University of Missouri and obtained a Master of Science in 2012 and Ph.D. in 2014 from Virginia Tech. Following graduate school, Dr. Bryce was selected as a Marie Curie post-doctoral research fellow on an EU funded project at the University of Nottingham in the UK. Following that, he spent three years in the Washington DC area working on federally funded research as a consultant where his research helped construct frameworks for addressing federal legislation related to Asset Management and Performance Management applied to transportation networks. Dr. Bryce's research interests include Transportation Asset Management, Pavement Management and Sustainability, Statistical Modeling of Non-Destructive Testing, and Subterranean Monitoring and Mapping. He currently has funded research from the Michigan DOT, South Dakota DOT, U.S. Federal Highway Administration, the U.S. Army Corps of Engineers and Wirtgen America.

Publications

- Bryce, J., Z. Ihnat, "Improved Models of Solar Radiation and Convective Heat Transfer for Pavement Temperature Prediction," International Journal of Pavement Engineering, 2020.
- Bryce, J., G. Elkins, T. Thompson, "Sensitivity Analysis of Highway Economic Requirements System Pavement Performance Models," Journal of Transportation Engineering, Part B: Pavements, 146, 04020006, 2020.
- Bryce, J., A. Chattopadhyay, M. Esmaeilpour and Z. Ihnat, "Detailing an Improved Heat Transfer Model for Pavements," Transportation Research Record, 0361198121994847, 2021.
- Bryce, J., A. Chattopadhyay, M. Esmaeilpour and Z. Ihnat, Revisiting Thermal Models for Understanding the Effect of Climate Change on Pavement Performance and the Effect of Pavements on Urban Heat Islands (No. TRBAM-21-01332), 2021.

Grants

- Bryce, J. (PI). Innovative Technologies to Search, Navigate, and Map Subterranean Unpredictable Environments. US Army Corps of Engineers, Engineering Research and Development Center. ($999,831). September 2019 through September 2021.
- Bryce, J. (in partnership with Michigan State University and Michigan Technological University). Evaluation of MDOT's Methodologies for both Quantifying Pavement Distress and Modeling Pavement Performance for Life-Cycle Cost and Remaining Service Life Estimation Purposes. Michigan Department of Transportation. ($114,935 for Marshall's effort). February 2021 through May 2023.
- Bryce, J. (in partnership with Michigan State University and Engineering Software Consultants, Inc.). Validation of Unified Pavement Distress Analysis and Prediction System (UPDAPS-II) Models Developed for Federal Highway Administration and Development of an Implementation Framework. US Federal Highway Administration. ($48,579 for Marshall's effort). February 2021 through July 2023.
- Bryce, J. (PI), Suk Joon Na (Co-PI). Development of the Pavement Preservation and Rehabilitation Academy. Wirtgen America. ($40,626). August 2019 through May 2021.
- Bryce, J. (in partnership with Wood E&IS Inc. and California State University, Chico). Supporting the Pavement Preservation Guide Update For South Dakota DOT and Local Agencies. South Dakota Department of Transportation. ($20,009 for Marshall's effort). January 2020 through March 2021.

Dr. Arka Chattopadhyay is a Research Assistant Professor in the Department of Civil Engineering at Marshall University. Dr. Chattopadhyay is originally from Hyderabad, India. He earned a Bachelor of Science in Mechanical Engineering from Jawaharlal Nehru Technological University in India. Following this, he came to the United States and joined the Mechanical and Nuclear Engineering Program at Kansas State University to pursue a Master of Science in Mechanical Engineering and Ph.D. in Engineering Mechanics from Virginia Tech. He joined Marshall University in 2018. Prior to his current position at Marshall University, he worked as a Visiting Research Associate and an Adjunct Faculty in the College of Engineering teaching engineering courses and performing collaborative research. His research interests focus on mechanics of materials and systems, mathematical modeling, numerical methods, and computational mechanics using the finite element analysis.

Publications

- Bryce, J., A. Chattopadhyay, M. Esmaeilpour and Z. Ihnat, "Detailing an Improved Heat Transfer Model for Pavements," Transportation Research Record, 0361198121994847, 2021.
- Bryce, J., A. Chattopadhyay, M. Esmaeilpour and Z. Ihnat, Revisiting Thermal Models for Understanding the Effect of Climate Change on Pavement Performance and the Effect of Pavements on Urban Heat Islands (No. TRBAM-21-01332), 2021.

Dr. Greg Michaelson is an Associate Professor in the Department of Civil Engineering at Marshall University. Originally from Bluefield, West Virginia, Dr. Michaelson earned his Ph.D. degree in Civil Engineering from West Virginia University 2014, and then joined the faculty at Marshall. Dr. Michaelson's research interests are focused in the area of structural engineering and include efficiency and economics of steel bridge design, nonlinear finite element modeling, structural stability, modular/accelerated bridge construction, and experimental investigation of structural systems.

Publications

- Barth K., G. Michaelson, A. Roh, R. Tennant, "Field Determined Live Load Distribution Factors for Modular Press-Brake-Formed Tub Girders," Transportation Research Record. 2675(3):1-7, 2021.

Dr. Sukjoon Na, who was born and raised in Seoul, South Korea, is an assistant professor in geotechnical engineering within the Department of Civil Engineering at Marshall University. He received his Ph.D. in Civil Engineering from Drexel University in 2016, M.S. from the University of Texas at Austin in 2009, and B.E from Chung-Ang University in 2005. His research interests focus on failure analysis of polymer composite materials, 3D printed polymers, geosynthetics, and sustainable construction materials. His interests also include underground detection technologies.

Publications

- Lee, S., S. Na, O. Rogers, and S. Youn, "Quantifying surface morphology of manufactured activated carbon and the waste coffee grounds using the Getis-Ord-Gi* statistic and Ripley's K function," Scientific Reports, 11(1), pp.1-9, 2021.
- Na S, S. Lee, S. Youn, "Experiment on Activated Carbon Manufactured from Waste Coffee Grounds on the Compressive Strength of Cement Mortars," Symmetry. 2021; 13(4):619.

Dr. Isaac Wait is a Professor and Chair of the Department of Civil Engineering at Marshall University. Originally from North Canton, Ohio, Dr. Wait earned a Bachelor of Science in Civil and Environmental Engineering and Master of Science of Civil Engineering from Brigham Young University, and then worked as a design engineer at Horrocks Engineers, in American Fork, Utah. Following that he earned a Ph.D. degree in Civil Engineering from Purdue University, and then worked as an Assistant Professor at the American University of Sharjah, in the United Arab Emirates. Dr. Wait has been at Marshall since 2009, teaching courses in water resources, environmental engineering, and engineering economics. His research interests include watershed modeling, hydraulic scour of rock, and engineering education, with funded projects from the National Science Foundation and West Virginia Division of Highways.

Publications

- Xiao, F., C Tian, I Wait, Z Yang, B Still, G. Chen, "Condition monitoring and vibration analysis of wind turbine," Advances in Mechanical Engineering 12 (3), 1-9, 2020.

Dr. Sungmin Youn was born and raised in Seoul, South Korea until he moved to Michigan to attend Calvin College where he earned his B.S. in Engineering. Upon graduating, Dr. Youn began the graduate civil engineering program at the University of Texas at Austin. He obtained his Master's degree in 2013 and Ph.D. in May 2017. Dr. Youn joined Marshall as an assistant professor in Civil Engineering in Aug 2017. His research focuses on water quality and physiochemical water treatment. He enjoys playing, watching, and talking about soccer.

Publications

- Lee, S., S. Na, O. Rogers, and S. Youn, "Quantifying surface morphology of manufactured activated carbon and the waste coffee grounds using the Getis-Ord-Gi* statistic and Ripley's K function," Scientific Reports, 11(1), pp.1-9, 2021.
- Mikelonis, A., K. Ratliff, and S. Youn, "Laboratory results and mathematical modeling of spore surface interactions in stormwater runoff," Journal of Contaminant Hydrology, 235, p.103707, 2020.
- Na S, S. Lee, S. Youn, "Experiment on Activated Carbon Manufactured from Waste Coffee Grounds on the Compressive Strength of Cement Mortars," Symmetry. 2021; 13(4):619.

Dr. Wael Zatar is a professor of Civil Engineering at Marshall University. He served as the Dean of the College of Engineering and Computer Sciences and the College of Information Technology and Engineering from 2011 to 2020. He served as Director of the Appalachian Transportation Institute and as Associate Director of the University Transportation Center Region 3 Mid-Atlantic Transportation Sustainability Center. Holding a tenured professor academic appointment, he served as the J.H. Fletcher Chair of Engineering at Marshall University. Many factual references support the positive impacts Dr. Zatar has made in the engineering and transportation fields. Dr. Zatar held memberships in six Transportation Research Board (TRB) committees, served as the chair of TRB AFF80 Standing Committee on Structural Fiber Reinforced Polymers for six years. He currently co-chairs TRB AKB10 Standing Committee on Innovative Highway Structures and Appurtenances. He is the Chair of the Student Education Committee of the Precast/Prestressed Concrete Institute. Dr. Zatar attracted and directed many funded projects from numerous governmental and state agencies. He authored/coauthored numerous journal papers and technical publications. He held memberships in professional societies, honor societies and national committees, and received numerous awards for his significant contributions to research and education.

Publications

- Malik, H. and W. Zatar, "Evaluating the Teaching Evaluations of One Hundred North American Schools," American Society for Engineering Education Annual Conference and Exposition (ASEE-2020), Montreal, Quebec, Canada, 2020.
- Xiao, F., D. Meng, Y. Yu, Y. Ding, L. Zhang, G. Chen, W. Zatar, and J. Hulsey, "Estimation Vehicle-Bridge Dynamic Responses Using Fiber Bragg Grating Strain Gages," Science Progress, 2020, Vol. 103(1) 1–14.
- Zatar, W., H. Nguyen, and H. Nghiem, "Ultrasonic Pitch and Catch Technique for Non-Destructive Testing of Reinforced Concrete Slabs," Journal of Infrastructure Preservation and Resilience, 2020.
- Zatar, W., F. Xiao, G. Chen, and J. Hulsey, "Identification of Viscoelastic Property of Pile-Soil Interactions with Fractional Derivative Model," Journal of Low Frequency Noise, Vibration and Active Control, SAGE, 2020.
- Zatar, W., H. Nguyen, and H. Nghiem, "FRP Retrofitting and Non-Destructive Evaluation for Corrosion-Deteriorated Bridges in West Virginia," American Concrete Institute Special Publication, ACI-SP-346, PP11-30, 2020.
- Zatar, W., H. Nguyen, and H. Nghiem, Structural Evaluation of Corten Steel Ancillary Highway Structures. Advance, SAGE Publication, 2020.
- Zatar, W. and T. Nguyen, "Mixture Design Study of Fiber-Reinforced Self-Compacting Concrete for Prefabricated Streetlight-Post Structures," Advances in Civil Engineering, Hindawi, Vol. 2020, Article ID 8852320, 7 pages, 2020.

Staff Members

Leigh E. McDonald – Administrative Secretary, Senior. - Education: Associate of Arts in Liberal Arts from Butte Community College, Oroville, CA. Hometown: Proctorville, Ohio; Interests: Fiber and mixed media artist, printmaking, gardening, hiking, member of local area arts and fiber arts groups, dog lover (Beagle).

Cumhur Cosgun – Structural Engineering Lab Manager. - Education: PhD in Civil Engineering, 2014 from Istanbul Technical University, Istanbul, Turkey. Hometown: Sivas, Turkey. Interests: Soccer, basketball, gardening, carpentry, cinema.

Hien Manh Nghiem – Postdoctoral Researcher. - Education: Ph.D in Geotechnical Engineering at the University of Colorado Denver, Colorado. Hometown: Huntington, West Virginia. Interests: the finite element method (FEM), constitutive models for soils and structural materials, soil-pile-structure interaction under static and dynamic loads, geo-reinforced soil (GRS) walls, earthquake engineering, destructive and non-destructive testing techniques, corrosion monitoring, structural health monitoring, analysis and design of reinforced/prestressed concrete, and steel structures, developing computer codes using FEM and other methods.

Publications

- Zatar, W., H. Nguyen, and H. Nghiem, "Ultrasonic Pitch and Catch Technique for Non-Destructive Testing of Reinforced Concrete Slabs," Journal of Infrastructure Preservation and Resilience, 2020.
- Zatar, W., H. Nguyen, and H. Nghiem, "FRP Retrofitting and Non-Destructive Evaluation for Corrosion-Deteriorated Bridges in West Virginia," American Concrete Institute Special Publication, ACI-SP-346, PP11-30, 2020.
- Zatar, W., H. Nguyen, and H. Nghiem, Structural Evaluation of Corten Steel Ancillary Highway Structures. Advance, SAGE Publication, 2020.

Hai D. Nguyen, PhD – Research Engineer (Senior). - Education: Master and PhD Degrees from Saitama University, Japan. Hometown: Proctorville, Ohio. Research Interests: Non-Destructive Testing and Evaluation of Materials and Structures, Advanced Materials and Fiber-Reinforced Polymer Composites, Rehabilitation of Civil and Railway Infrastructures, Maintenance of Navigation Structures, Smart Sensing Technology in Structural Health Monitoring, Composite Structures, Joining Techniques for Structural Members, Laboratory Testing and Numerical Modeling, Data Science and Analytics. Personal Interest: Computer programming, reading, hiking.

Publications

- Zatar, W., H. Nguyen, and H. Nghiem, "Ultrasonic Pitch and Catch Technique for Non-Destructive Testing of Reinforced Concrete Slabs," Journal of Infrastructure Preservation and Resilience, 2020.
- Zatar, W., H. Nguyen, and H. Nghiem, "FRP Retrofitting and Non-Destructive Evaluation for Corrosion-Deteriorated Bridges in West Virginia," American Concrete Institute Special Publication, ACI-SP-346, PP11-30, 2020.
- Zatar, W., H. Nguyen, and H. Nghiem, Structural Evaluation of Corten Steel Ancillary Highway Structures. Advance, SAGE Publication, 2020.

Advisory Board Members

- **Dewey Bocook**, Owner, Bocook Engineering
- **Sean Carter**, Chief, Geotechnical and Water Resources, U.S. Army Corps of Engineers
- **Cindy Cramer**, Director, Traffic Engineering Division, WV Department of Highways
- **Ian Fitzpatrick**, Project Engineer, Geiger Brothers
- **Ron Gilkerson**, President, GRW Engineering
- **Dave Meadows**, Regional Manager, Triad Engineering
- **Jessica Meadows**, Engineer, Steel of West Virginia
- **Jason Merritt**, Senior Project Manager, Cenergy
- **Charlie Neighborgall**, Neighborgall Construction
- **J.T. Weatherford**, Manager Terminal Development, CSX Intermodal
- **Adam Weible**, Regional Manager, Prime Engineering

Update from the SAME-ASCE Student Chapter

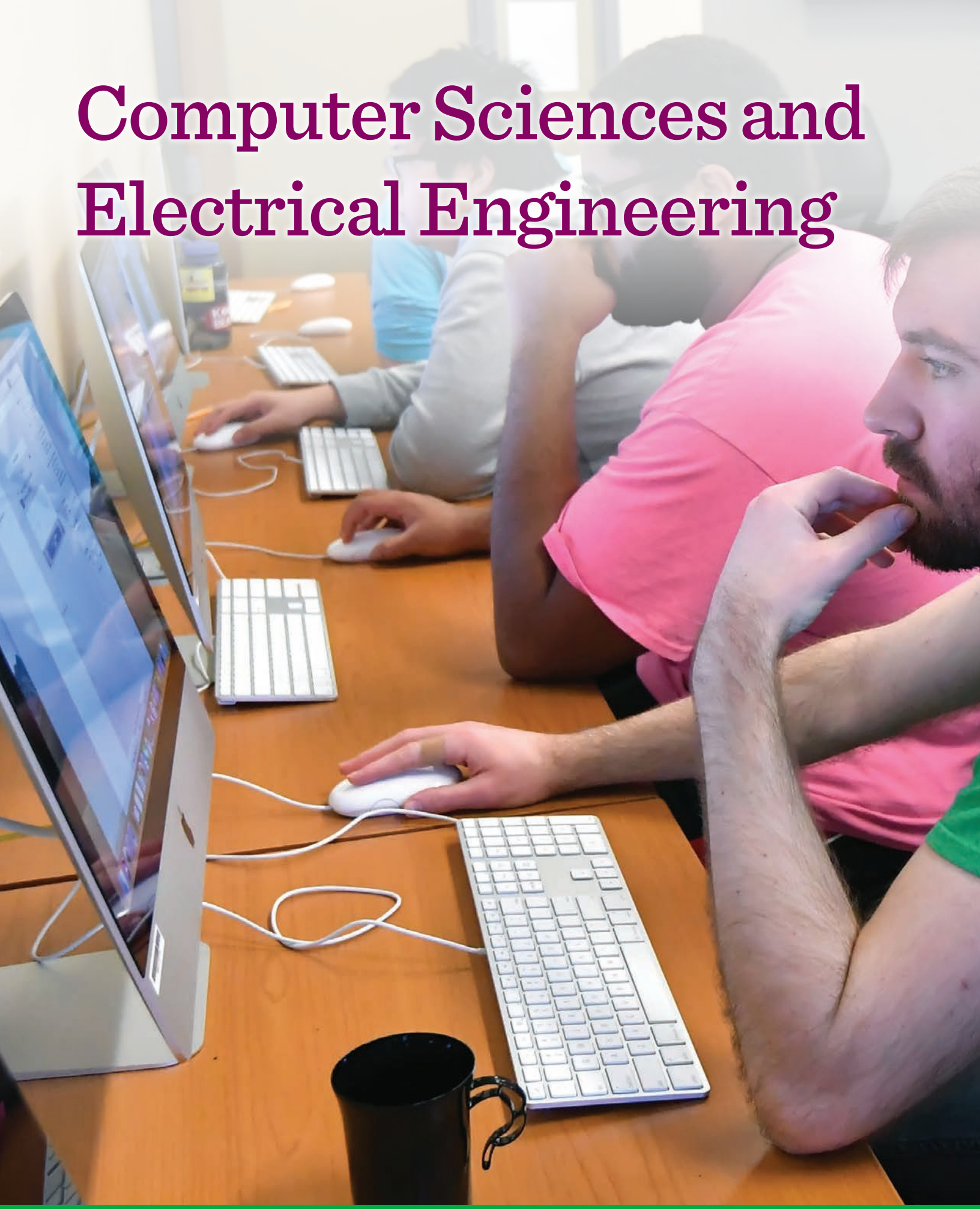
The COVID-19 pandemic has brought with it challenges to higher education, including sustaining vibrant and healthy extracurricular activities. Despite these challenges, the joint chapter of the Society of American and Military Engineers (SAME) and the American Society of Civil Engineers (ASCE) have maintained an active year, serving both the surrounding engineering community as well as participating in regional competitions.

In January 2021, the SAME-ASCE student chapter hosted the 13th Annual (and first ever virtual) Richard F. McCormick Technical Conference. Each January, our SAME-ASCE student chapter hosts a technical conference to provide continuing education for practicing engineers in the surrounding area, including consultants, WVDOH, and USACE (Huntington District) personnel. Over 180 people attended this year's event, making it the most heavily attended conference in the chapter's history. Presentation topics included: Modeling Interior Drainage for the Milton Flood Risk Management Project, Failure of the Tallest MSE Slope in North America, Ethical Evolution: Professional Rules and the Engineer's Role in Innovation, Drones and Artificial Neural Network to Evaluate Buildings Location Suitability for Photovoltaic Devices Installation, Multiscale Sinkhole Vulnerability Assessment, and West Virginia's Inaugural Infrastructure Report Card.

Also, throughout the year, the chapter worked to compete from campus in the 2021 AISC Steel Bridge Competition. The competition took place in late April and included timed construction as well as loading the bridge (both laterally and vertically). The bridge was completely fabricated by the students (including grinding, drilling, cutting, and welding). The steel bridge team can be seen pictured below with their completed bridge.

2021 Marshall University Steel Bridge Team: From L to R: Harrison Randolph, Zack Ihnat, Trevor Thewes, Shanekiqua Mitchell, Cole Klemstine, Jonathan Geis (not pictured: Dalton Garrison)

Computer Sciences and Electrical Engineering



Faculty Members

Dr. Jamil Chaudri is a Professor of Computer Sciences. He earned his Ph.D. in Management from the University of Durham in the U.K., his M.Sc. in Computer Science from the University of Nottingham in the U.K., and the B.S. in Mathematics from Honours University of Salford.

Dr. Tanvir Chowdhury is an Assistant Professor in the Department of Computer Sciences and Electrical Engineering at Marshall University. Dr. Chowdhury received his bachelor's degree from Bangladesh University of Engineering and Technology (BUET) and a master's degree and a doctoral degree from the University of Texas at San Antonio (UTSA). Dr. Chowdhury is originally from Chattogram, Bangladesh. His research interests include Human-Computer Interaction (HCI), Virtual / Augmented / Mixed Reality Applications, Computer Graphics, 2D/3D User Interface, Serious Games, and Rehabilitation.

Publications

- Ferdous, S., S. Mohammad, T. Chowdhury, I. Arafat, and J. Quarles, "Static Rest Frame to Improve Postural Stability in Virtual and Augmented Reality," Frontiers in Virtual Reality 1 (2020): 45.

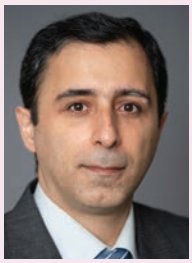
Dr. David A. "Dave" Dampier currently serves as Professor, Interim Dean of the College of Engineering and Computer Sciences at Marshall, and Interim Chair of Biomedical Engineering. Prior to this, he served as Associate Dean for Research in the college. He has an M.S. and Ph.D. in Computer Science from the U.S. Naval Postgraduate School in Monterey, CA, and a B.S. in Mathematics from the University of Texas at El Paso. He grew up in Florida and now lives "out" Wayne, WV. His research Interests are Cyber Security, Digital Forensics, and Software Engineering. His personal Interests are family, especially his 5 grandchildren, woodworking, and Taekwondo.

Publications

- Al-Dhaqm, A., S. Ruzak, D. Dampier, K. Choo, K. Siddique, R. Ikuesan, and A. Alqarni, "Categorization and Organization of Database Forensic Investigation Processes," IEEE Access, June 2020.

Research Grants

- Narman, H., Dampier, D., PI: 2020 GenCyber Teacher Summer Camp (NSA/NSF, $72,992.62)
- Yoo, W., Wahjudi, P., Dampier, D., Surber, S., Cartwright, T., NSF S-STEM: Scholarships and a Project-based Work Studio to Support Undergraduate Student Graduation and Entry into Computer Science, Engineering, and Safety Technology Careers, Co-PI, $990,550, 10/2020 – 9/2025



Dr. Taher Ghomian is an Assistant Professor of Electrical and Computer Engineering. He earned his Ph.D. in Electronics Engineering from Louisiana State University in Baton Rouge, LA, and performed a postdoctoral fellowship at the University of California at Davis. He is originally from Tabriz, Iran, and now resides in Huntington, WV. His research interests include energy conversion, nanomaterials, photonics, and electronics. His personal interests include swimming, biking, and hiking.

Publications

- Ghomian, T., H. Jeong, V. Pan, K. Celik, M. Alangari, Y. Ke, and J. Hihath. "High-Throughput Dielectrophoretic Trapping and Detection of DNA Origami." Advanced Materials Interfaces 8, no. 5, 2021.

Dr. Sanghoon Lee is an Assistant Professor of Computer Sciences. He earned his Ph.D. and M.S. in Computer Science from Georgia State University, as well as a M.S. and B.S in Computer Science from the University of Suwon in Korea. He served in a postdoctoral fellowship at Emory University. Originally from Seoul, South Korea, Dr. Lee now resides in Huntington, WV. His research interests include machine learning, deep learning, and artificial intelligence in interdisciplinary domains.

Publications

- Lee, S., S. Na, O. Rogers, and S. Youn, "Quantifying surface morphology of manufactured activated carbon and the waste coffee grounds using the Getis-Ord-Gi* statistic and Ripley's K function," Scientific Reports, 11(1), pp.1-9, 2021.
- Lee, S., M. Amgad, P. Mobadersany, M. McCormick, B. Pollack, H. Elfandy, H. Hussein, D. Gutman, and L. Cooper, " Interactive classification of whole-slide imaging data for cancer researchers," Cancer Research, 81(4), pp.1171-1177, 2021.
- Lee, S., Y. Zhao, M. Masoud, and S. Belkasim, "Quantitative Spatial Analysis on Whole Slide Images Using U-Net," Computational Biology and Bioinformatics. vol. 8, no. 2, 2020, pp. 90-96.
- Lee, S., C. Farley, S. Shim, W. Yoo, Y. Zhao, and W. Choi, "Unsupervised Learning of Deep-Learned Features from Breast Cancer Images," Proceedings of the 20th IEEE International Conference on Bioinformatics and Bioengineering (BIBE) (pp. 740-745), 2020.
- Na S, S. Lee, S. Youn, "Experiment on Activated Carbon Manufactured from Waste Coffee Grounds on the Compressive Strength of Cement Mortars," Symmetry. 2021; 13(4):619.

Dr. Haroon Malik is an Assistant Professor of Computer Sciences. He received his Ph.D. in Computer Science from Queen's University in Canada. Originally from Rawalpindi, Pakistan, he now resides in Huntington, WV. Dr. Malik also serves as Co-Chair of the Marshall University Data Sciences Council. His research interests include wireless sensor networks (wsn), internet of things (iot), mining social repositories (msr) and performance testing. His personal interests include gardening and traveling.

Publications

- Farrag, S., M. El-Hansali, A. Yasar, E. Shakshuki, H. Malik, "A Microsimulation-Based Analysis For Driving Behaviour Modelling On A Congested Expressway", Journal of Ambient Intelligence and Humanized Computing, Volume 11, Springer, 2020.
- Farrag, S. .N. Sahli, M. El-Hansali, E. Shakshuki, A. Yasar, H. Malik, STIMF: a smart traffic incident management framework. Journal of Ambient Intelligence Humanized Computing. Vol. 12 No. 1,pp. 85-101 (2021)
- Kaja, S., E. Shakshuki, S. Guntuka, H. Malik, "Acknowledgment Scheme Using Cloud For Node Networks With Energy-Aware Hybrid Scheduling Strategy", Journal of Ambient Intelligence and Humanized Computing, Volume 11, Springer, 2020.
- Malik, H. and W. Zatar, "Evaluating the Teaching Evaluations of One Hundred North American Schools," American Society for Engineering Education Annual Conference and Exposition (ASEE-2020), Montreal, Quebec, Canada, 2020.
- Malik, H. and E. Shakshuki, "Emerging Trends in Ubiquitous Systems and Pervasive Networks," Future Generation Computer Systems Journal, Volume 110, Elsevier, 2020.
- Narman H., H. Malik, and G. Yatnalkar, "An Enhanced Ride Sharing Model Based on Human Characteristics, Machine Learning Recommender System, and User Threshold Time," Springer Journal of Ambient Intelligence and Humanized Computing 2021 - Invited
- Shakshuki, E., A. Ul-Haq, and H. Malik, "Applications Of Machine Learning In Pervasive Systems", Journal of Ambient Intelligence and Humanized Computing, Springer Heidelbert, 2020.
- Yasar, A., H. Malik, E. Shakshuki, S. Galland, Special issue on trends & advances to mine intelligence from ambient data. Pers. Ubiquitous Comput Journal, Springer. 25(1): 1-5 (2021)

Grants

- Malik, H., NASA EPSCoR Seed Grant, "Unmanned Aerial Vehicle (UAV) Assisted Structural Health Monitoring" $9,000

Dr. Tarek Masaud is an Assistant Professor of Electrical Engineering. He received his Ph.D. degree in Electrical Engineering from Colorado School of Mines, his M.Sc. in Electrical Engineering from the BSc degree from Colorado School of Mines, and his B.S. from 7th of April University, Sabrata, Libya. His research interests include integration of renewable energy systems and storage systems in Microgrids and distribution networks, including technical and economic aspects. His personal interests are soccer and travelling.

Publications

- Masaud, T. and E. El-Saadany, "Optimal Tie-Line and Battery Sizing for Remote Provisional Microgrids", IET Generation, Transmission, & Distribution. December 2020.
- Masaud, T., J. Warner, and E. El-Saadany, "A Blockchain-Enabled Decentralized Energy Trading Mechanism for Isolated Interconnected Microgrids", IEEE Access. Vol. 8, pp 211291 – 211302, November, 2020.

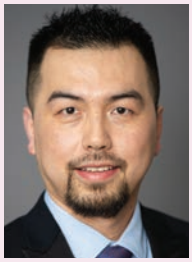
Dr. Husnu S. Narman is an Assistant Professor of Computer Science. He received his Ph.D. in Computer Science from the University of Oklahoma. He currently lives in South Point, OH. His research interests include distributed computing, including cloud and edge computing, the internet of things, cyber-physical systems, machine learning applications, social networks, and content delivery networks. He has over 45 peer-reviewed publications and more than seven years of teaching experience in K-12 and higher education. He has extensive experience with teaching computer science-themed summer camps in the past. He organized the Computer Science Adventure Zone K-12 and Teacher Summer Camp to increase Computer Science and Cybersecurity awareness in WV in the last several years. He is the recipient of the 2020-2021 College of Engineering and Computer Sciences Weisberg Academy of Distinguished Teachers Award and the 2020-2021 Marshall University Distinguished Artists and Scholars Junior Category Award.

Publications

- Arnob P., M. Islam, M. Hossain, and H. Narman, "A novel zone walking protection for secure DNS Server," International Journal of Interdisciplinary Telecommunications and Networking, Vol. 13, 2021. (Accepted)
- Carter, J., H. Narman, O. Cosgun, and J. Liu, "Trade-off Model of Fog-Cloud Computing for Space Information Networks," Proceedings of the IEEE Cloud Summit 2020.
- Dipon, T., M. Hossain, and H. Narman, "Detecting Network Intrusion through Anomalous Packet Identification," Proceedings of the International Telecommunication Networks and Applications Conference, 2020.
- Hossain, M., M. Hossain, and H. Narman "Detection of Undesired Events on Real-World SCADA Power System Through Process Monitoring," Proceedings of the 2020 Ubiquitous Computing, Electronics & Mobile Communication Conference, IEEE 2020.
- Islam, M., P. Hridi, M. Hossain, and H. Narman, "Network Anomaly Detection Using LightGBM: A Gradient Boosting Classifier," Proceedings of the International Telecommunication Networks and Applications Conference, 2020.
- Kalaichelavan, K., H. Malik, H. Narman, and S. Sreenath, "What People Complain about Drone Apps? A Large-Scale Empirical Study of Google Play Store Reviews," Proceedings of the 11th International Conference on Ambient Systems, Networks and Technologies, 2020.
- Khan, S., A. Das, M. Hossain, and H. Narman, "Prediction of Dengue Infected Areas Using a Novel Blockchain Based Crowdsourcing Framework," Proceedings of the 2020 Ubiquitous Computing, Electronics & Mobile Communication Conference, IEEE 2020.
- Lewis, J., G. Tambaliuc, H. Narman, and W. Yoo, "IP Reputation Analysis of Public Databases and Machine Learning Techniques," Proceedings of the IEEE International Conference on Computing, Networking and Communications, 2020.
- Liu, J., H. Shen, H. Chi, H. Narman, Y. Yang, L. Cheng, and W. Chung, "A Low-Cost Multi-Failure Resilient Replication Scheme for High Data Availability in Cloud Storage," IEEE/ACM Transactions on Networking, 2020.
- Narman H., H. Malik, and G. Yatnalkar, "An Enhanced Ride Sharing Model Based on Human Characteristics, Machine Learning Recommender System, and User Threshold Time," Springer Journal of Ambient Intelligence and Humanized Computing 2021 - Invited
- Prapty, R., A. Shuhana, M. Hossain, and H. Narman, "Preventing Session Hijacking using Encrypted One-Time-Cookies," Proceedings of the Wireless Telecommunications Symposium (WTS 2020), 2020.
- Sreenath, S., H. Malik, H. Narman, and K. Kalaichelavan, "Assessment and Use of Unmanned Aerial Vehicle for Civil Structural Health Monitoring," Proceedings of the 3rd International Conference on Emerging Data & Industry 4.0, Warsaw, Poland, 2020.
- Yatnalkar, G., H. Narman, and H. Malik, "An Enhanced Ride Sharing Model Based on Human Characteristics and Machine Learning Recommender System, Proceedings of the 3rd International Conference on Emerging Data & Industry 4.0, Warsaw, Poland, 2020.

Grants

- Bryce, J. (PI), S. Na (Co-PI), H. Narman (Co-PI), Development of the Pavement Preservation and Rehabilitation Academy. Wirtgen America. ($40,626). August 2019 through May 2021.
- Narman, H., Mentor - 2021 Summer Creative Discovery and Research Award (Marshall University, $5000.00)
- Narman, H., Mentor - 2021 Spring NASA Undergraduate Affiliate Fellowship (NASA, $1000.00)
- Narman, H., Mentor - 2020 Summer Undergraduate Research Experience Fellowship (Marshall University, $3200.00)
- Narman, H., Mentor - 2020 NASA Undergraduate Research Fellowship (NASA, $5000.00)
- Narman, H., Mentor - 2020 Spring NASA Undergraduate Affiliate Fellowship (NASA, $1000.00)
- Narman, H., Dampier, D., PI: 2020 GenCyber Teacher Summer Camp (NSA/NSF, $72,992.62)
- Narman, H., PI: 2020 Summer John Marshall Scholar Award (Marshall University, $6,500)



Dr. Cong Pu is an Assistant Professor in the Department of Computer Sciences and Electrical Engineering. He received his M.S. and Ph.D. in Computer Sciences from Texas Tech University and his B.S. in Computer Science and Technology from Zhengzhou University in China. His research interests include cryptography, network security, wireless networks, mobile computing, and information-centric networking.

Publications

- Pu, C., "A Novel Blockchain-Based Trust Management Scheme for Vehicular Networks," Proceedings of the 20th IEEE Wireless Telecommunications Symposium (WTS), pp., April 21-23, 2021. Accepted to Appear.
- Pu, C., "ProNDN: MCDM Based Interest Forwarding and Cooperative Data Caching for Named Data Networking," Journal of Computer Networks and Communications, Vol. 2021, pp. 1--16, 2021.
- Pu, C. and Y. Li, "Lightweight Authentication Protocol for Unmanned Aerial Vehicles Using Physical Unclonable Function and Chaotic System," Proceedings of the 2020 IEEE International Symposium on Local and Metropolitan Area Networks (LANMAN), pp., 2020.
- Pu, C. and L. Carpenter, "Psched: A Priority-Based Service Scheduling Scheme for the Internet of Drones", IEEE Systems Journal, May, 2020.
- Pu, C., "Sybil Attack in RPL-Based Internet of Things: Analysis and Defenses," IEEE Internet of Things Journal, Vol. 7, Iss. 6, pp. 4937--4949, 2020.
- Pu, C., J. Brown, and L. Carpenter, "A Theil Index-Based Countermeasure Against Advanced Vampire Attack in Internet of Things,", Proceedings of the 2020 IEEE 21st International Conference on High Performance Switching and Routing (HPSR), pp. 1--6, 2020.
- Lim, S., C. Pu, C. Jinseok, M. Manki, and L. Yi, "Hide-and-Detect: Forwarding Misbehavior, Attack, and Countermeasure in Energy Harvesting Motivated IoT Sensor Networks," Chapter in Energy Harvesting in Wireless Sensor Networks and Internet of Things, IET Press (London, UK), Accepted To Appear, 2021.

Dr. Paulus Wahjudi currently serves as Professor of Computer Sciences and Interim Associate Dean of the college. In August 2021, he will begin his first term as Chair of the Department of Computer Sciences and Electrical Engineering. He earned his B.S., M.S. and Ph.D. degrees in Computer Science from the University of Southern Mississippi in 2001, 2003 and 2007, respectively and joined Marshall University in 2009. His research interests include intrusion detection and threat intelligence in cyber infrastructure where he has secured funding from the industry, federal, state and local organizations. During his career, Dr. Wahjudi has received over $1 million in funding for various research in computing, cybersecurity, and educational activities. Originally from Jakarta, Indonesia, Dr. Wahjudi now resides in Proctorville, OH. There are several rumors roaming around about Dr. Wahjudi, some say that he once took over 19 hours in the summer and that he completed his Bachelor's degree in just two years because he is too lazy. All we know is, Dr. Wahjudi is an avid supporter of his students and dedicated to ensuring they become successful upon graduation.

Grant

- Yoo, W., Wahjudi, P., Dampier, D., Surber, S., Cartwright, T., NSF S-STEM: Scholarships and a Project-based Work Studio to Support Undergraduate Student Graduation and Entry into Computer Science, Engineering, and Safety Technology Careers, Co-PI, $990,550, 10/2020 – 9/2025

Dr. Wook-Sung Yoo is currently Professor and Chair of the Department of Computer Sciences and Electrical Engineering. He earned his Ph.D. and M.S. in Computer Science from Florida Institute of Technology. He also earned a D.D.S. from Seoul National University. Originally from South Korea, he now resides in Huntington, WV. His research interests include artificial intelligence, software engineering, cybersecurity, data science, and informatics applying computing technology in interdisciplinary fields.

Publications

- Ahmed, I., W. Xu, R. Annavajjala, and W. Yoo, "Joint Demodulation and Decoding with Multi-Label Classification Using Deep Neural Networks", Proceedings of the 3rd Annual International Conference on Artificial intelligence in Information and Communication, Jeju, Korea, April 16-18, 2021.
- Kaul, J., G. Weed, J. Cunningham, I. Ahmed, W. Yoo, "Adaptive Solar Energy Harvesting and Data Transmission," Proceedings of the American Society for Engineering Education North Central Section Conference, March 19-20, 2021.
- Lee, S., C. Farley, S. Shim, W. Yoo, Y. Zhao, and W. Choi, "Unsupervised Learning of Deep-Learned Features from Breast Cancer Images," Proceedings of the 20th IEEE International Conference on Bioinformatics and Bioengineering (BIBE) (pp. 740-745), 2020.
- Lewis, J., G. Tambaliuc, H. Narman, and W. Yoo, "IP Reputation Analysis of Public Databases and Machine Learning Techniques," Proceedings of the IEEE International Conference on Computing, Networking and Communications, 2020.

Research Grants

- Yoo, W., Wahjudi, P., Dampier, D., Surber, S., Cartwright, T., NSF S-STEM: Scholarships and a Project-based Work Studio to Support Undergraduate Student Graduation and Entry into Computer Science, Engineering, and Safety Technology Careers, Co-PI, $990,550, 10/2020 – 9/2025
- Yoo, W., Faculty Mentored Internship Program (FMIP) Grant, appx. $300,000, 2019-2021, West Virginia Department of Education.

Dr. Pingping Zhu is an Assistant Professor of Electrical Engineering. He received his Ph.D. from the University of Florida in Gainesville, FL. He did postdoctoral fellowships at both Duke University and Cornell University. Originally from Wuhan, China, he now lives in Huntington, WV. His research interests include signal processing, machine learning, reinforcement learning and approximate dynamic programming, intelligent control, information theoretical learning, neural networks, and artificial intelligence. His personal interests include family and reading.

Publications

- Doerr, B, R. Linares, P. Zhu, and S. Ferrari, "Random Finite Set Theory and Centralized Control of Large Collaborative Swarms." Journal of Guidance, Control, and Dynamics Vol. 44, no. 3 (2021), pp. 505-521.
- Dong, J., P. Zhu, and S. Ferrari, "Oriented Pedestrian Social Interaction Modeling and Inference." Proceedings of the 2020 American Control Conference (ACC), pp. 1373-1370. IEEE, 2020.
- Zhu, P., C. Liu, and S. Ferrari. "Adaptive Online Distributed Optimal Control of Very-Large-Scale Robotic Systems." IEEE Transactions on Control of Networks, under review.

Staff Members

Dawn Rayburn — Administrative Secretary Sr. - Education: Bachelor's Degree in Accounting from Strayer University, Associates Degree in Applied Business from Daymar College. Hometown: Wheelersburg, Ohio. Interests: Camping, cross-stitch, traveling, exploring, and an animal person.

Advisory Board Members

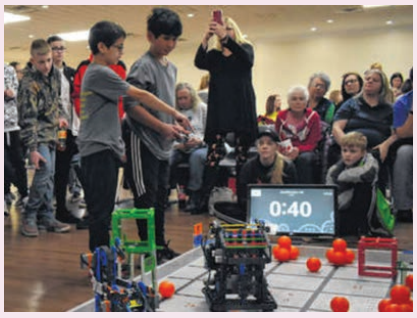
- **Lee Farabaugh**, Co-Owner, Core 10
- **Jeffrey Legge**, CIO, City National Bank of West Virginia
- **Clarence Martin**, CEO, State Electric
- **Mike Owens**, President and CEO, Strictly Business
- **Steven Paine**, State Superintendent, WV Department of Education
- **Robert Plymale**, COO, Appalachian Transportation Institute
- **Brian Pratt**, Director IS & C, WV Office of Technology
- **Tammy Shingleton**, Director of Operations, Frontier Communications
- **Joshua Spence**, CIO, WV Office of Technology
- **Debra Stinson**, Engineer III, Core 10

IEEE Student Branch at Marshall

IEEE Student Branch at Marshall was formed in April 2018 and is located in Region 2. The IEEE Student Branch gives students opportunities to meet and learn from fellow IEEE student and graduate student members and engage with professional IEEE members locally. Due to the COVID pandemic, limited activities were undertaken in 2020-2021. The following is a highlight of the chapter activities:

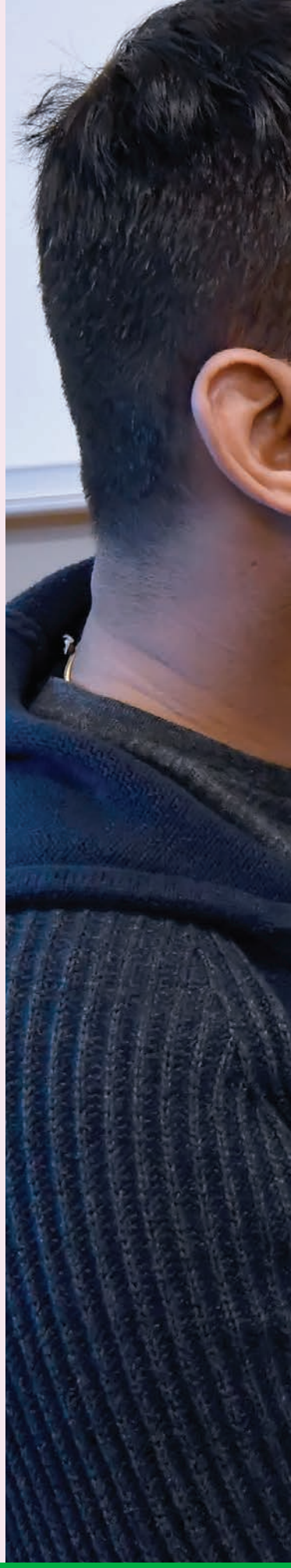
- November 17, 2020: Invited a keynote speaker (virtually) from office of Career Education at Marshall (Beth Waugh) to talk to students about tools and resources for developing a professional resume as well as identifying job search strategies.
- April 1, 2021: Invited a keynote speaker (Trisha Severs) who is an engineering supervisor from Special Metals Corp, Huntington, WV, to talk to students about tools and resources for developing their project management skills, which include: Leadership skills, communication skills, task management, etc.

Community Service Leadership Program (CSLP)

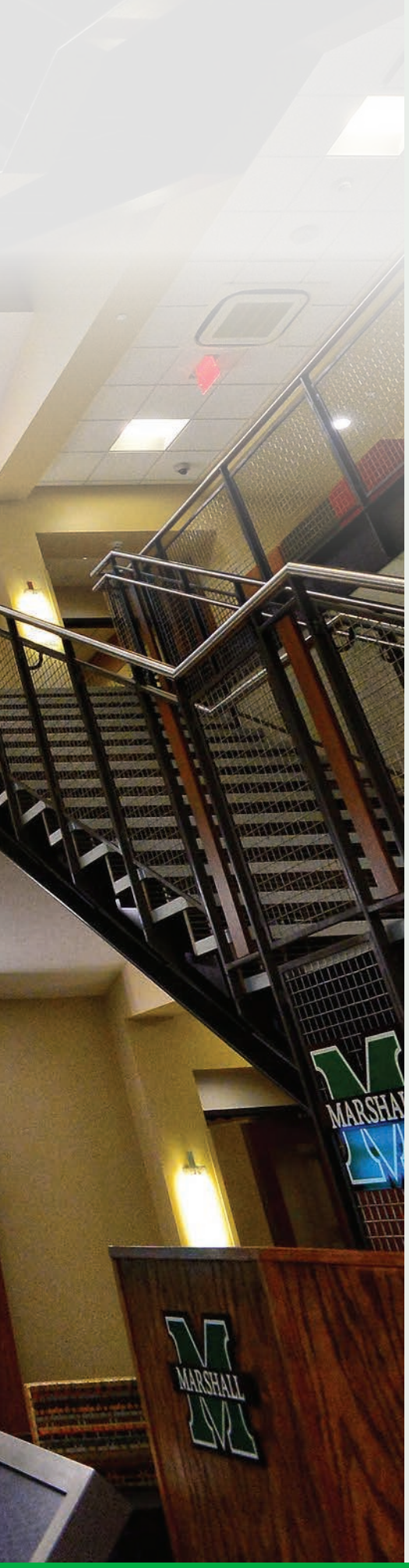


Community Service Leadership Program (CSLP) in the Computer Sciences and Electrical Engineering at Marshall University provides an opportunity to develop leadership skills and professionalism and promote computing and engineering education in the community. The CSLP has been an integral part of the extra-curricular activities of the Computer Sciences and Electrical Engineering Department. The students in CSLP have been engaged in various activities such as mentoring middle and high school students for VEX Robotics, hosting computing workshops for K-12 students, supporting CS A-Z Sumer Camp, Cybersecurity Camps, and other fun activities. The CSLP also created remote computing sessions and activities using Google Classrooms and e-conferencing tools to provide various hands-on STEM activities for K-12 students. Students involved this year were:

- **Hannah Vitalos** – B.S. Candidate in Computer Science
- **Caleb Patrick** – B.S. Candidate in Computer Science
- **Hwapyeong Song** – M.S. Candidate in Computer Science
- **Bailey Protzman** – B.S. Candidate in Electrical Engineering
- **Caleb Johnson** – B.S. Candidate in Electrical Engineering



Mechanical Engineering



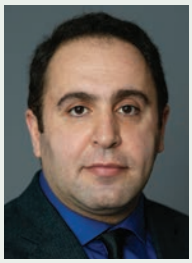
Faculty Members

Dr. Ronald Bieniek is a Professor of Mechanical Engineering. He was born in South Gate, California, and now resides in Huntington, West Virginia. He received a Bachelor of Science in Physics from the University of California-Riverside. After spending his first year of graduate school at M.I.T., Bieniek earned a Master of Arts degree in History of Science and a Ph.D. in Physics from Harvard University. Over his career, he has been a professor of physics science, astronomy, humanities, physics, and engineering. He has also been a resident scholar at Technische Universität Kaiserslautern, Oxford University, Max Planck Institut für Quantenoptik, Observatoire de Paris, Universitá di Firenze, University of the Western Cape, and Stanford University. Most of his research career centered on atomic and molecular interactions, but later evolved into issues related to student learning. The institutional programs Bieniek established were designed to nurture and enhance student, faculty, and university success. He has contributed to the education of over 12,000 students, from science and engineering majors to English and sociology students, through the engineering, physics, astronomy, and honors courses he has taught. Prof. Bieniek has won several teaching awards, and chaired the development committee for the SAT Subject Test in Physics for several years. His non-academic interests include foreign travel, book collecting, and leather bookbinding.

Dr. Gang Chen is a Professor of Mechanical Engineering. He has a Ph.D. in Mechanical Engineering from Nanyang Technical University in Singapore. Hometown: Huntington, WV. Research Interests: Dynamical systems-mechanical systems, vehicle systems, sustainable energy systems and microsystem.

Publications

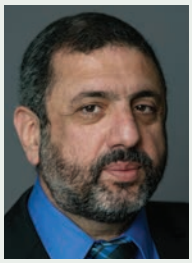
- Zhang, L., D. Meng, G. Chen, Noise, Vibration and Harshness of Electric and Hybrid Vehicles, SAE International, 2021, ISBN of 978-0-7680-9964-5, 398 pages.
- Wang, Y., Y. Wang, G. Chen, "Robust composite adaptive neural network control for air management system of PEM fuel cell based on high-gain observer," Neural Computing and Applications 32(14): 10229-10243, 2020.
- Xiao, F., D. Meng, Y. Yu, Y. Ding, L. Zhang, G. Chen, W. Zatar, and J. Hulsey, "Estimation Vehicle-Bridge Dynamic Responses Using Fiber Bragg Grating Strain Gages," Science Progress, 2020, Vol. 103(1) 1–14.
- Xiao, F., C Tian, I Wait, Z Yang, B Still, G. Chen, "Condition monitoring and vibration analysis of wind turbine," Advances in Mechanical Engineering 12 (3), 1-9, 2020.
- Zatar, W., F. Xiao, G. Chen, and J. Hulsey, "Identification of Viscoelastic Property of Pile-Soil Interactions with Fractional Derivative Model," Journal of Low Frequency Noise, Vibration and Active Control, SAGE, 2020.



Dr. Mehdi Esmaeilpour is an assistant professor in the Department of Mechanical Engineering at Marshall University. Prior to joining Marshall University, he held a Research Assistant professor position at IIHR (Hydroscience-Engineering Laboratory), the University of Iowa. He received his Ph.D. from the University of Iowa in 2017, and completed his dissertation research in Ship Hydrodynamics Group at the University of Iowa. Dr. Esmaeilpour teaches both undergraduate and graduate courses in mechanical engineering. His research interests are in the area of Computational Fluid Dynamics (CFD), Experimental Fluid Dynamics (EFD) multiphase flow and energy.

Publications

- Bryce, J., A. Chattopadhyay, M. Esmaeilpour& Z. Ihnat, "Detailing an Improved Heat Transfer Model for Pavements," Transportation Research Record, 0361198121994847, 2021.
- Bryce, J., A. Chattopadhyay, M. Esmaeilpour& Z. Ihnat, Revisiting Thermal Models for Understanding the Effect of Climate Change on Pavement Performance and the Effect of Pavements on Urban Heat Islands (No. TRBAM-21-01332), 2021.
- Singh, G., M Esmaeilpour, A Ratner, "Effect of carbon-based nanoparticles on the ignition, combustion and flame characteristics of crude oil droplets," Energy 197 (15), 117227, 2020.
- Yin, Z., M. Esmaeilpour, "The hydrodynamic performance of a turbine in shallow free surface flow," Journal of Hydrodynamics. (Accepted).



Dr. Iyad Hijazi is an Associate Professor of Mechanical Engineering. He has a PhD. in Mechanical Engineering from New Mexico State University and Postdoctoral Fellowship at Georgia Institute of Technology. Prior to academia, he had ten years of industrial experience. His research interests include empirical atomistic modeling and first principle calculations to probe for nanomaterials with unique properties. His recent research focused on metal hydrides for hydrogen separation, purification and storage, and piezoelectric materials for sensors and electric power generation.

Publications

- Hijazi I, C. Zhang and R. Fuller, "Potentials for Pd-Ag-Cu Metal Hydrides Energy Simulations," Proceedings of the International Mechanical Engineering Congress and Exposition. IMECE2021-71494. (2021) (abstract accepted).
- Zhang C., R. Fuller, and I. Hijazi, An Efficient Embedded Atom Method Potentials for the Pd-Ag-Cu-H System. Special Issue: Hydrogen Energy: Sustainable Production, Storage and Utilization. Journal of Energy and Power Technology, 2021.

Dr. Xia Hua is an Assistant Professor of Mechanical Engineering. He received his PhD in Mechanical Engineering from Purdue University, West Lafayette, IN. He was born in Zhejiang, China, and now resides in Huntington, WV. His professional interests include computational mechanics, dynamics systems, design optimization, particulate systems, and emerging vehicle systems. His personal interests include travel, swimming, basketball, and listening to music.

Publications

- Hua, X., A. Thomas and K. Shultis, "Recent Progress in Electric Vehicle Noise, Vibration, and Harshness," Science Progress, Vol.104, No.1, pp.1-11, 2021
- Hua, X.,and E. Gandee, "Vibration and Dynamics Analysis of Electric Vehicle Drivetrains," Journal of Low Frequency Noise, Vibration & Active Control, Vol. 0, No. 1, pp. 1-11, 2021.
- Hua, X., S. Qiang and W. Hang "Influence of Gear-Shaft-Bearing Configurations on Vibration Characteristics of Spiral Bevel Geared Drives," SAE International Journal of Vehicle Dynamics, Stability, and NVH, Vol. 4, No. 3, 2020.
- Hua, X., "Vibration and Dynamic Analysis of Right-angle Geared Drives," SAE International Journal of Advances and Current Practices in Mobility, Vol. 2, No. 6, pp. 3174-3179, 2020.
- Hua, X. and Z. Chen. Effect of Roller Bearing Elasticity on Spiral Bevel Gear Dynamics. Advances in Mechanical Engineering, Vol. 12, No. 6, pp. 1–9, 2020.
- Jiang, Y., Y. Guo, Z. Yu, X. Hua, J. Lin, C. Wassgren and J. Curtis, "DEM-CFD Analyses of Flexible Fiber Fluidization," Journal of Fluid Mechanics, Vol. 910, No. A8, 2021.
- Li, S. and X. Hua "Advances in Automatic Hexahedral Meshing," Journal of Physics: Conference Series, Vol. 1637, 012141, 2020.
- Xu, X., X. Ai, R. Chen, G. Jiang and X. Hua, "Research on Roll Stability of Articulated Engineering Vehicles Based on Dynamic Lateral Transfer Load," Proc IMechE Part D: Journal of Automobile Engineering, Vol. 234, No. 9, pp. 2364-2376, 2020.

- Yu, L., S. Qiang, W. Xu, X. Hua, C. Xu, J. Lai, Y. Min and C. Bo, "Verification of Concrete Nonlinear Creep Mechanism Based on Meso-Damage Mechanics," Construction and Building Materials, Vol. 276, 122205, 2021.
- Yuan, M., D. Zhou, J. Chen, X. Hua and S. Qiang, "Study on the Calculation Method of Stress in Strong Constraint Zones of the Concrete Structure on the Pile Foundation Based on Eshelby Equivalent Inclusion Theory," Materials, Vol. 13, No. 17, 2020.

Grants

- Hua, X., "Modeling the microstructure of lithium-ion battery electrodes used in a spacecraft", $20,000 (NASA: $10,000; Cost Share: $10,000).

Dr. Roozbeh "Ross" Salary is an Assistant Professor in both Mechanical Engineering and Biomedical Engineering. He received his Ph.D. in Industrial and Systems Engineering (Advanced Manufacturing) from State University of New York (SUNY) at Binghamton, NY, USA. He now resides in Huntington, WV. His research Interests include Biomedical Fabrication, Tissue Engineering, Regenerative Medicine, and Artificial Intelligence.

Publications

- Chaffins, M., P. Yu, P. Claudio, J. Day, and R. Salary, "Investigation of the Functional Properties of Additively-Fabricated Triply Periodic Minimal Surface-Based Bone Scaffolds for the Treatment of Osseous Fractures," ASME Manufacturing Science and Engineering Conference (MSEC 2021), Cincinnati, OH, USA, June 21 - 25, 2021.
- Lawrence, L., J. Day, P.Claudio, R. Salary, "Investigation of the Regenerative Potential of Human Bone Marrow Stem Cell-Seeded Polycaprolactone Bone Scaffolds, Fabricated Using Pneumatic MicroExtrusion Process," Proceedings of the ASME Manufacturing Science and Engineering Conference (MSEC 2021), Paper Number: MSEC2021-63411, Cincinnati, OH, USA, June 21 - 25, 2021.
- Salary, R., J. Lombardi, D. Weerawarne, P. Rao, and M. Poliks, "A Computational Fluid Dynamics Investigation of Pneumatic Atomization, Aerosol Transport and Deposition in Aerosol Jet Printing Process," ASME Transactions, Journal of Journal of Micro and Nano-Manufacturing, Paper Number: JMNM-20-1007.
- Salary, R., J. Lombardi, D. Weerawarne,, M. Tootooni, P. Rao, and M. Poliks, "A Sparse Representation Classification Approach for Near Real-Time, Physics-Based Functional Monitoring of Aerosol Jet-Fabricated Electronics," ASME Transactions, Journal of Manufacturing Science and Engineering, Paper No: MANU-18-1807, 142(8): 081007, August 2020.
- Weese, N., C. Rankin, D. Zhao, C. Hart, P. Quinlan, J. Day, and R. Salary, "Experimental Optimization of Polymer Jetting Additive Manufacturing Process Using Taguchi Design," ASME International Mechanical Engineering Congress & Exposition (IMECE 2020), Portland, OR, USA, November 16-19, 2020.
- Yeow, Y., M. Yu, J. Day, and R. Salary*, "A Computational Fluid Dynamics (CFD) Study of Material Flow in Pneumatic MicroExtrusion (PME) Additive Manufacturing Process," ASME International Mechanical Engineering Congress & Exposition (IMECE 2020), Paper Number: IMECE2020-24325, Portland, OR, USA, November 16-19, 2020.
- Yu, M., L. Lawrence, P. Claudio, J. Day, and R. Salary, "Pneumatic MicroExtrusion-Based Additive Biofabrication of Polycaprolactone Bone Scaffolds – Part II: Investigation of the Influence of Polymer Flow Parameters," ASME Manufacturing Science and Engineering Conference (MSEC 2021), Paper Number: MSEC2021-63412, Hosted by the University of Cincinnati, Cincinnati, OH, USA, June 21 - 25, 2021.
- Yu, M., Y. Yeow, L. Lawrence, P. Claudio, J. Day, and R. Salary, "Investigation of the Effects of Design and Process Parameters on the Mechanical Properties of Biodegradable Bone Scaffolds, Fabricated Using Pneumatic MicroExtrusion Process," ASME International Mechanical Engineering Congress & Exposition (IMECE 2020), Paper Number: IMECE2020-24252, Portland, OR, USA, November 16-19, 2020.
- Zhao, D., M. Yu, L. Lawrence, P. Claudio, J. Day, and R. Salary, "Investigation of the Influence of Consequential Design Parameters on the Mechanical Performance of Biodegradable Bone Scaffolds, Fabricated Using Pneumatic Micro-Extrusion Additive Manufacturing Process," ASME Manufacturing Science and Engineering Conference (MSEC 2020), Paper Number: MSEC2020-8512, Volume 1, V001T03A009, University of Cincinnati, Cincinnati, OH, USA, June 22-26, 2020. DOI: 10.1115/MSEC2020-8512.
- Zhao, D., C. Hart, N. Weese, C. Rankin, J. Kuzma, J. Day, and R. Salary, "Experimental and Computational Analysis of the Mechanical Properties of Biocompatible Bone Scaffolds, Fabricated Using Fused Deposition Modeling Additive Manufacturing Process," ASME Manufacturing Science and Engineering Conference (MSEC 2020), Paper Number: MSEC2020-8511, Volume 1, V001T03A008, University of Cincinnati, Cincinnati, OH, USA, June 22-26, 2020. DOI: 10.1115/MSEC2020-8511.

Dr. Yousef Sardahi is an assistant professor in the Weisberg Department of Mechanical Engineering at Marshall University. He earned a Ph.D. in Mechanical Engineering at the University of California, Merced. His research interests include Control System Design and Multi-Objective Optimization. His teaching experience includes Control Systems, Digital Controls, Automation and Control, System Modeling, Advanced Vibrations, Mechatronics, Circuits and Instrumentations, and Mechanical Engineering Computations.

Publications

- Chen, Y., Y. Sardahi, S. Hajjar, and C. Greer, "Multi-Objective Optimal Design of a Cascade Control System for a Class of Underactuated Mechanical Systems." International Journal of Mechanical and Mechatronics Engineering Vol.14, no. 5 (2020): pp.196-202.
- Chen, Y., and Y. Sardahi, "Multi-Objective Optimal Design of an Active Aeroelastic Cascade Control System for an Aircraft Wing with a Leading and Trailing Control Surface," Proceedings of the Dynamic Systems and Control Conference, vol. 84287, p. V002T37A001. American Society of Mechanical Engineers, 2020
- Greer, C., Y. Sardahi, and R. Kolonay. "A Comparative Study on Multidisciplinary and Optimal Control Design of an Aircraft Wing," Proceedings of the 2021 American Control Conference (ACC), 2021. (Accepted)
- Sardahi, Y. and R. Kolonay. "Multi-objective and Multidisciplinary Optimal Design of a flexible Wing with Multiple Ailerons," Proceedings of the American Control Conference (ACC) 2021. Accepted.

Dr. Asad Salem currently serves as Professor and Interim Chair of the Department of Mechanical Engineering. He has a Ph.D. in Mechanical Engineering from University of Akron in Akron, OH and a B.S. in Mechanical Engineering from the University of Mississippi in Oxford, MS. Dr. Salem is an Ideal ABET Scholar and has extensive experience in ABET Accreditation. His research interest includes: Thermal Science, Computational Fluid Dynamics (CFD), Finite Elements, Renewable and Sustainable Energy Sources such as Wind and Solar, Co-generation, Cryogenic Thermodynamics Cycles, LNG Production and Emissions, Energy Storage, Plasma Cutting and Welding, Non-Newtonian Fluids and Drag Reduction and their Biomedical Applications and Polymers Processing and Manufacturing. His teaching interests include Thermodynamics, Heat Transfer, Fluids Mechanics, Renewable Energy, Sustainability, Thermal Management, Fuel cells, and Water Desalination.

Publications

- Salem, A. "Liquefied Natural Gas (LNG) Assisted Liquid Air Energy Storage System", Accepted by the Recent Advances in Environmental and Earth Sciences and Economics- 2021
- Salem, A, and Z. Salem "LNG Regasification System to Enhance the Performance of Gas Turbines and Liquid Air Energy Storage System, Inter. J. of Energy (Accepted).

Research Grants

- Salem, A., Canopy Air Curtain to Reduce Respirable Coal Mine Dust for Shuttle Car Operators. NIOSH-CDC, Completed 2020.

Staff Members

Leigh E. McDonald – Administrative Secretary, Senior. - Education: Associate of Arts in Liberal Arts from Butte Community College, Oroville, CA. Hometown: Proctorville, Ohio. Interests: Fiber and mixed media artist, printmaking, gardening, hiking, member of local area arts and fiber arts groups, dog lover (Beagle).

James Kuzma – Mechanical Engineering Lab Technician. - Education: Physics Undergraduate at Syracuse University. Hometown: Binghamton, NY. Personal and/or Professional Interests: Electronics design, machining, renewable energy, organic gardening.

Advisory Board Members

- **April Bailey**, Engineer, JH Fletcher
- **Katherine Burgess**, Powertrain Engineer, Toyota
- **Tim Burgess**, VP of Engineering, JH Fletcher
- **Samuel Butzer**, Project Engineer, ZMM Architects
- **Anthony Ferguson**, Project Manager, Marathon Oil
- **Greg Gaynor**, Senior Manager Organization Development, Special Metals
- **Mark Holderby**, Director Quality & Engineering, Special Metals
- **James Hook**, Engineer, Braskem
- **Thomas Kay**, Department Manager – Project & Mechanical, Jacobs
- **Curtis Martin**, Engineering Manager, Toyota
- **Roger Painter**, Associate R&D Director-Pilot Plant Operations, Dow Chemical
- **John Skaff**, Director of Business Development, CDI Engineering Solutions

Faculty Publications

1. Ahmed, I., W. Xu, R. Annavajjala, and **W. Yoo**, "Joint Demodulation and Decoding with Multi-Label Classification Using Deep Neural Networks", *Proceedings of the 3rd Annual International Conference on Artificial intelligence in Information and Communication*, Jeju, Korea, April 16-18, 2021.
2. Aldebs, A., F. Zohora, **N. Nosoudi**, S. Singh, and J. Ramirez-Vick. "Effect of Pulsed Electromagnetic Fields on Human Mesenchymal Stem Cells Using 3D Magnetic Scaffolds." *Bioelectromagnetics***,** 2020.
3. Al-Dhaqm, A., S. Ruzak, **D. Dampier**, K. Choo, K. Siddique, R. Ikuesan, and A. Alqarni, "Categorization and Organization of Database Forensic Investigation Processes," *IEEE Access,* June 2020.
4. **Alzarrad, M.,** "Fuzzy Monte Carlo Simulation to Optimize Resource Planning and Operations." *Industrial Engineering: Gary Moynihan*. InTechOpen, Rijeka, Croatia, 2020.
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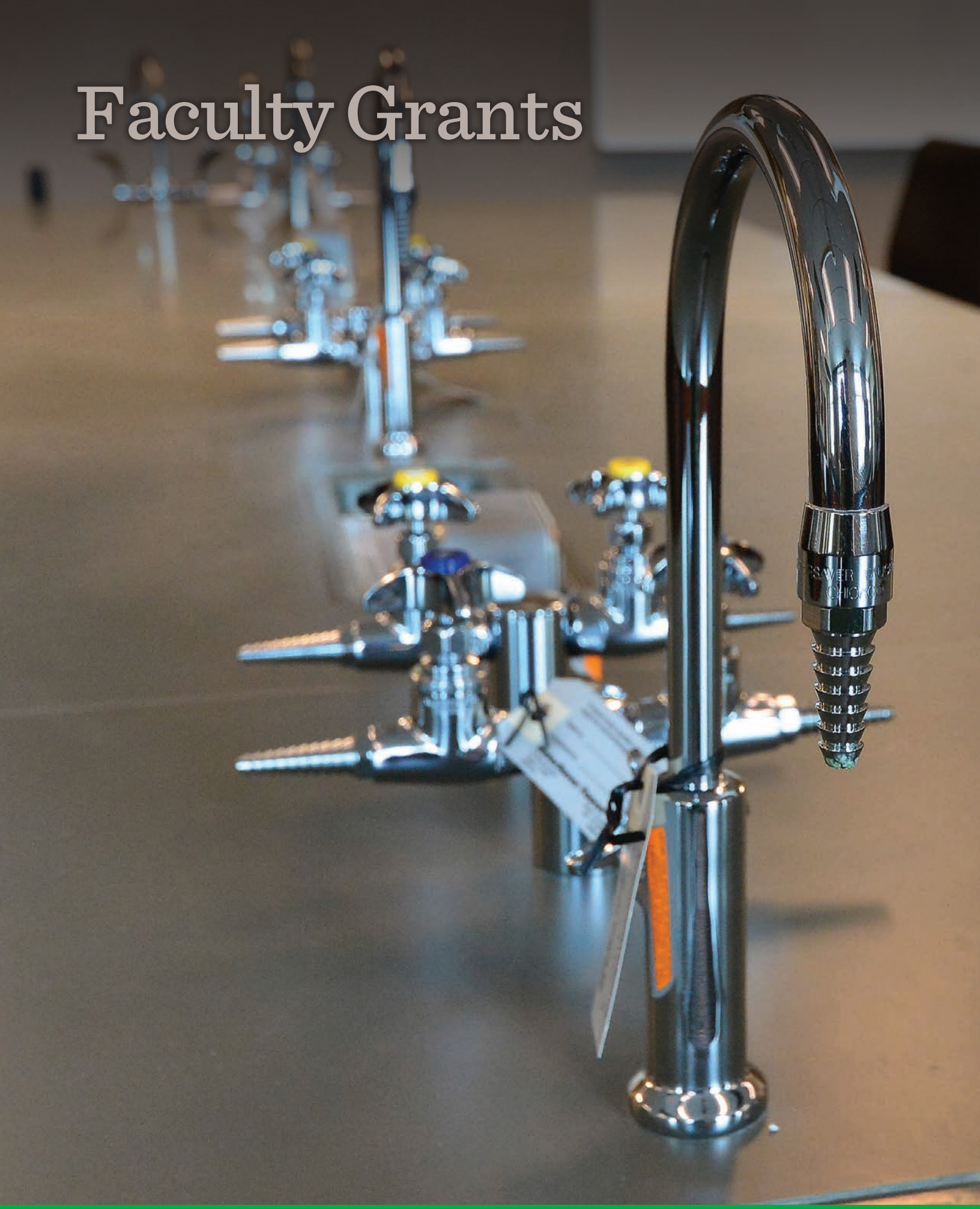
Faculty Grants



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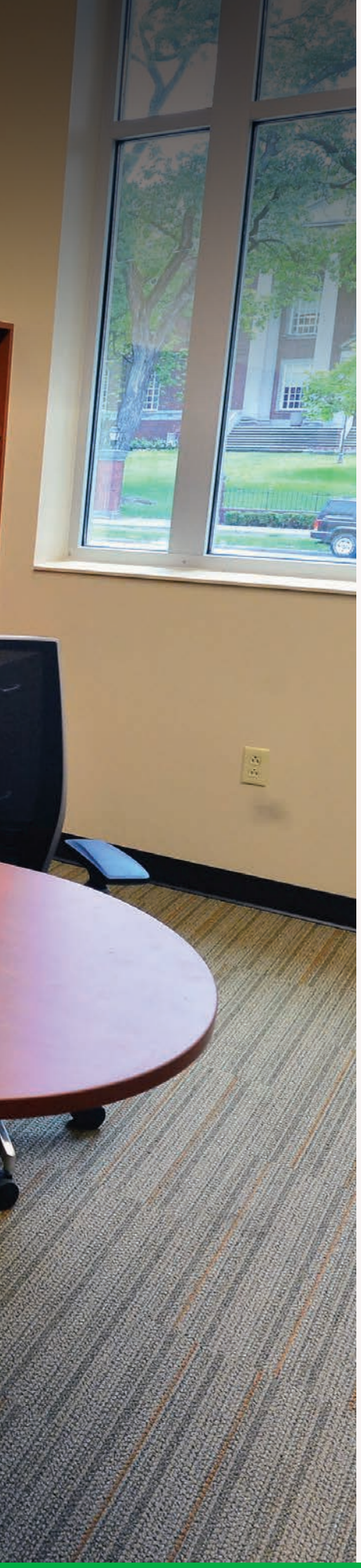
12. **Narman, H**., Mentor - 2021 Spring NASA Undergraduate Affiliate Fellowship (NASA, $1000.00)
13. **Narman, H**., Mentor - 2020 Summer Undergraduate Research Experience Fellowship (Marshall University, $3200.00)
14. **Narman, H**., Mentor - 2020 NASA Undergraduate Research Fellowship (NASA, $5000.00)
15. **Narman, H**., Mentor - 2020 Spring NASA Undergraduate Affiliate Fellowship (NASA, $1000.00)
16. **Narman, H**., Dampier, D., PI: 2020 GenCyber Teacher Summer Camp (NSA/NSF, $72,992.62)
17. **Narman, H**., PI: 2020 Summer John Marshall Scholar Award (Marshall University, $6,500)
18. **Salem, A**., Canopy Air Curtain to Reduce Respirable Coal Mine Dust for Shuttle Car Operators. ($349,000) **NIOSH-CDC**, Completed /2020.
19. Schall, M**., X. Zhang**, H. Chen, S. Gallagher, N. Fethke, "Comparing upper arm and trunk kinematics between manufacturing workers performing predominantly cyclic and non-cyclic work tasks," *Applied Ergonomics*. 93 (2021) 103356.
20. **Surber, S.,** Substance Abuse and Mental Health Services Administration (SAMHSA) grant ($2.5 million), *Recovery, Treatment, and Workforce Support*, Co-Principal Investigator and Evaluation Team Researcher for Marshall University
21. **Surber, S.,** West Virginia Higher Education Policy Commission (WVHEPC) grant ($1,000), *Developing and Utilizing Open Educational Resources Materials*, Principal Investigator
22. **Surber, S.,** West Virginia Foster, Adoptive and Kinship Care Network and West Virginia Department of Health and Human Resources (WVDHHR), *Survey for Kinship, Foster Care, and Adoptive Parents*, Researcher (completed 2021)
23. **Surber, S.,** Health Resources and Services Administration (HRSA) Rural Communities Opioid Response Program (R-CORP) planning grant ($200,000), *Appalachian Rural Opioid Consortium*, Researcher (completed 2020)
24. **Szwilski, A**., 'Sub-pilot-scale Production of High-Value Products from U.S. Coals', Dept. Energy $1.9 million. Collaborating with Universities of Utah and Wyoming.
25. **Szwilski, A**., 2019-2021 Co-Principal Investigator: 'Assessment of Rail Systems Structural Adequacy in Military Theaters Using Nondestructive Testing and Structural Monitoring Capabilities', U.S. Army Engineer Research and Development Center, $999,785.
26. **Szwilski, A**., 2015-2020 Co-Investigator: RII Track 1- Appalachian Freshwater Initiative, WVEPSCoR-NSF. rating institutions: West Virginia University, Marshall University, West Virginia State University. RII Track 1: Gravitational Waves and Appalachian Initiative. Total project funding $20 million.
27. **Yoo, W., Wahjudi, P., Dampier, D., Surber, S**., Cartwright, T., NSF S-STEM: Scholarships and a Project-based Work Studio to Support Undergraduate Student Graduation and Entry into Computer Science, Engineering, and Safety Technology Careers, Co-PI, $990,550, 10/2020 – 9/2025
28. **Yoo, W.S.**, Faculty Mentored Internship Program (FMIP) Grant, appx. $300,000, 2019-2021, West Virginia Department of Education.

College Staff



Camella "Cammy" Holley – Business Manager I. - Education: Associate Degree of Applied Science in Secretarial Administration from Ashland Community and Technical College, Ashland, KY. Hometown: Catlettsburg, KY. Interests: Camping, gardening, spending time with my grandkids.

Husein Al Qawasmi – Instructional Technologist. - Education: MS in Information Systems – Marshall University, 2005. Hometown: Huntington, WV. Interests: Reading, traveling, community/volunteer work, puzzles, and pc games.

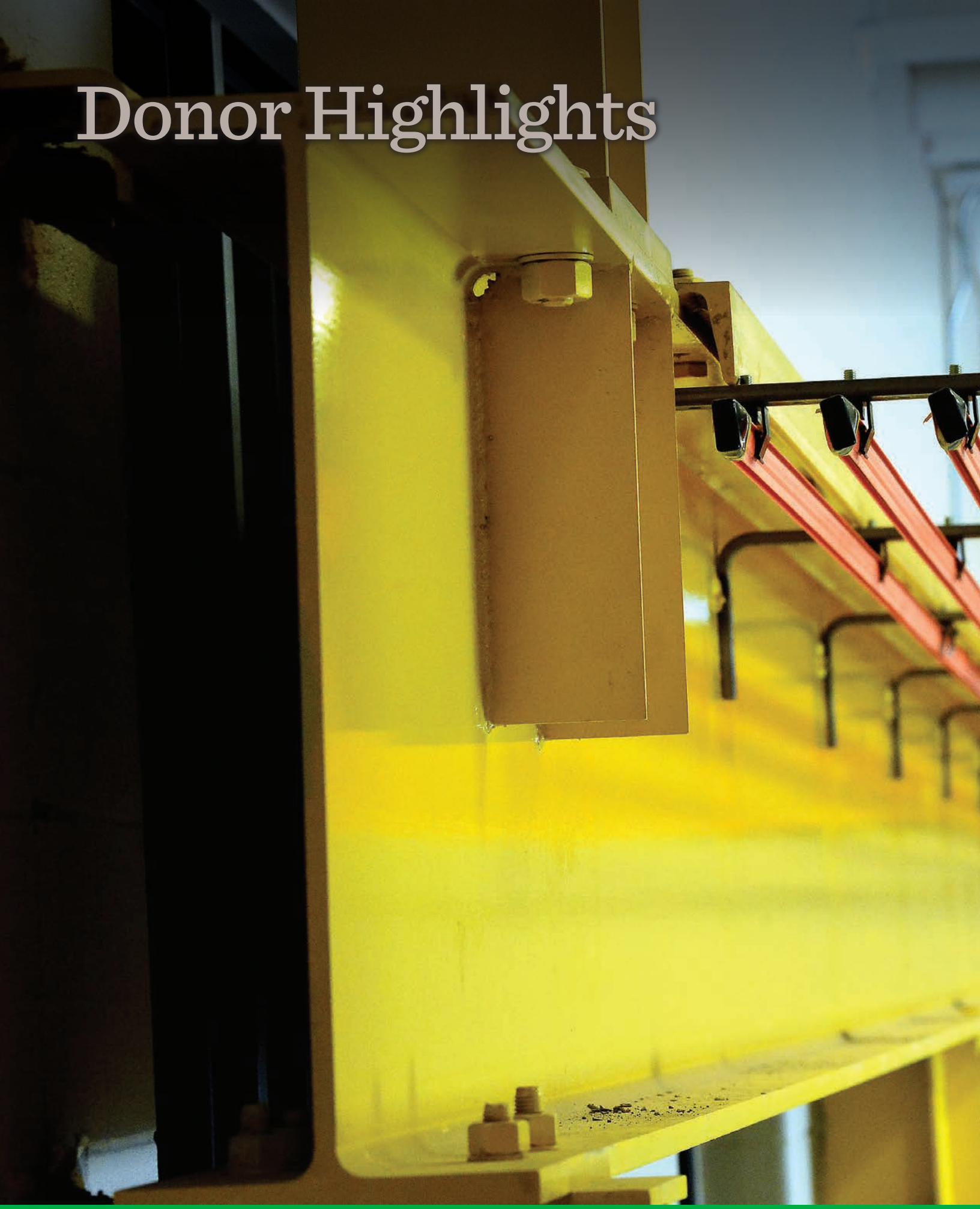
Tanner G. Drown – Co-Op Coordinator. Education: Master of Arts in Leadership Studies from Marshall University, Huntington, WV. Hometown: Huntington, WV. Interests: Golf, hiking, hunting, and my German Shepard (Ellie).

Patrick Quinlan, Jr., E.I. — Engineering Technician. Education: BSCE (Minor in Mathematics), West Virginia Institute of Technology, Montgomery, WV. Hometown: Saint Albans, WV, and Salem, OR(second hometown). Professional Interests: Research, roadway design, lab testing, and materials testing. Personnel Interests: Time with family, fishing, writing, playing/writing/listening to music, biking, hiking, and camping.

Penny Basenback – Administrative Secretary, Senior. Hometown-Proctorville, Ohio. Education: Regents, Bachelor of Arts with a minor in History from Marshall University. Personal interests: Travel and reading crime novels.

Hallie R. Evans —Administrative Associate. Education - Attended Mountwest Community and Technical College, and Marshall University. Hometown: Lavalette, WV. Interests: True Crime TV shows, dog lover (Yorkie), collecting vintage vinyl records, and taking hikes.

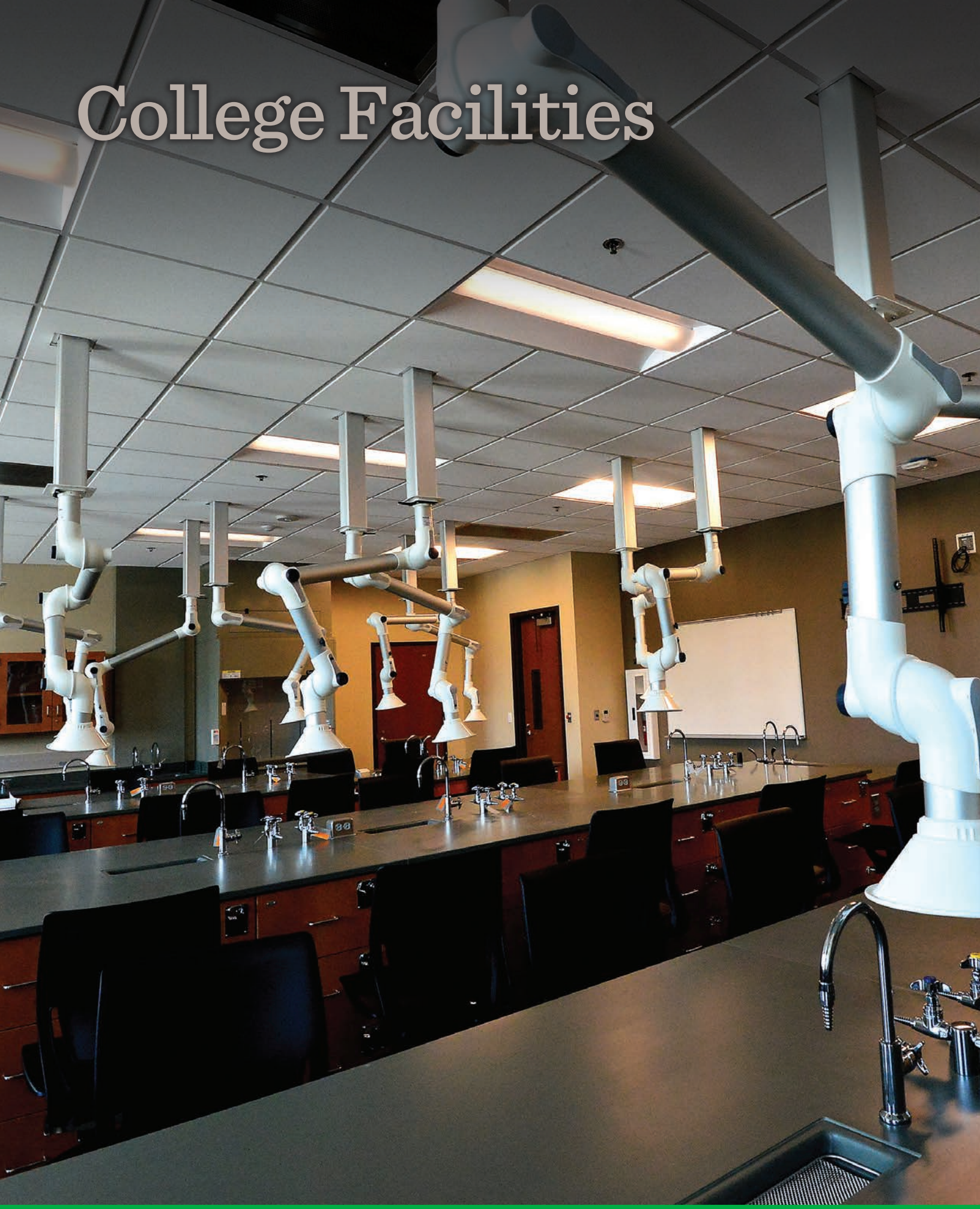
Donor Highlights

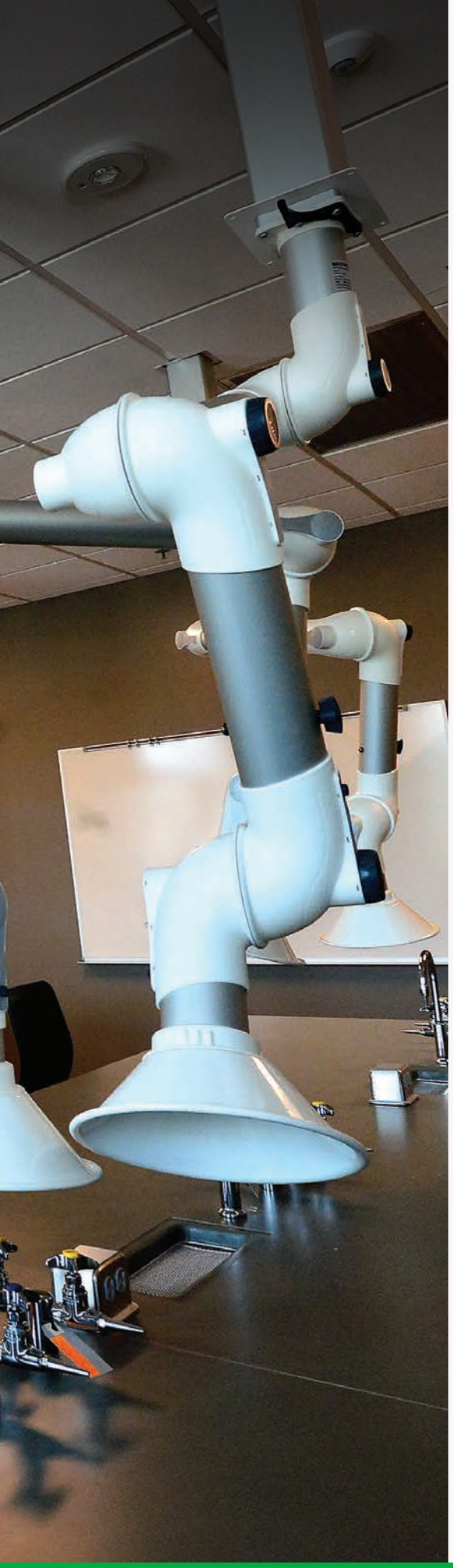


The college has enjoyed funding and equipment contributions from the following entities this year:

- Marathon Petroleum
- Encova Insurance
- Champion Industries
- TC Energy
- USI insurance Services
- ICL-IP
- American Electric Power
- Apex Pipeline Services, Inc.
- ORR Safety
- OHD Corporation
- Jenkins- Fenstermaker
- Steptoe & Johnson
- Precision Castparts Corporation (Special Metals)

College Facilities





The College of Engineering and Computer Sciences (CECS), including the departments of biomedical engineering, civil engineering, mechanical engineering, computer sciences and electrical engineering, and applied science and technology have been housed in the Weisberg Applied Engineering Complex (WAEC) since 2015. The WAEC is a state-of-the-art, multi-story facility which is organized to promote collaboration between the university's colleges and research corporations. It houses six different academic and research programs that include the College of Engineering and Computer Sciences, Mathematics & Computational Sciences, Computer Modeling & Digital Imaging, and the Marshall University Research Corporation (MURC). It also houses faculty offices, classrooms, and many science, engineering, and computer laboratories. Laboratory functions include traditional wet bench biological sciences, dry technology development laboratories and applied engineering laboratories. CECS occupies over 21,000 square feet of laboratory, office and support space. The WAEC provides space for offices to accommodate all of CECS's academic and administrative functions. In addition to the WAEC, the college has continued to occupy the Weisberg Engineering lab (WEL), a 13,000-square-foot structure, completed in 2008 to meet the critical need for engineering labs space on campus and two EE labs in the Gullickson Hall (GH) (GH05 and 206A). The WEL was the first building on the Marshall Campus constructed specifically for engineering. It is a space designed for flexible use so that it can accommodate a large lab, or several small labs. At the current time, about half of this large space is used as a manufacturing/machine-shop/capstone lab for the civil and mechanical engineering students. It also houses the Robotic and Autonomous Control lab, and an EE Capstone lab in support of the EE program. The other half is used as a soils and civil engineering materials lab.

Classrooms

CECS currently has a total of six dedicated classrooms and four computer labs in the WAEC and WEL.

The classrooms are designed to accommodate 32-96 students. Two computer labs are used primarily for engineering courses. They have a capacity of 36 students each. Classrooms each have an instructor station and projection capabilities.

The WAEC and WEL include spacious, well-lit collaboration areas for students including 17 computer-huddlestations. Tables and comfortable chairs are provided in the large lobby area for students to gather and work on homework. The collaboration space is heavily used, and the tables are rarely empty.

Laboratories

The WAEC has designated spaces for the following engineering labs: Advanced Materials Testing lab, Environmental lab, Thermal Engineering lab, Hydraulics and Pneumatics lab, Fluids and Hydraulics lab, Controls and Instrumentation lab, Industrial Controls lab, Circuits and PLC lab, and a Machine-shop. The WEL has civil engineering materials and soil, 3-D printing, manufacturing machine-shop/capstone labs, Robotic and Autonomous Control lab, the EE Capstone Lab, and a Visualization Lab. The Gullickson Hall (GH) houses two EE labs. The first lab is designated for the electric power and energy conversion (GH 05). While, the second lab (GH 206A) is designated for the communications, electronics, microprocessors and microcontrollers.

An assessment is conducted each year to ensure that the appropriate equipment is available for the upcoming academic offerings in engineering. An annual evaluation of equipment is conducted each summer. Should replacement equipment be needed for the upcoming academic year, it is ordered through the standard purchasing system. There are funds designated for future maintenance in the operating budget. See Appendix C - Equipment for a list of major instructional and laboratory equipment.

MARSHALL UNIVERSITY
COLLEGE OF ENGINEERING
AND COMPUTER SCIENCES

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