

MISSISSIPPI STATE UNIVERSITY™DEPARTMENT OF AGRICULTURALAND BIOLOGICAL ENGINEERING

# Fall 2024 N E W S L E T T E R

Department of Agricultural and Biological Engineering







It gives me great pleasure to reach out to all of you, our ABE friends and family, to tell you how things are going in ABE, which is generally very well. On the other hand, change is a consistent fact of life, and as we approach the end of 2024, we are reflecting on a lot of change in ABE. Unfortunately, some of this change is bittersweet, like three retirements. If you have been associated with ABE in the last

35 years or so, there is no doubt that you know **Dr. Filip To**, ABE Professor, who is retiring in January. **Dr. Joel Paz**, ABE Professor, who has been in the department for over 15 years, is also retiring in January. You can read more about them later in this newsletter. Finally, you may have known **James Wooten**, ABE Extension Associate, who was also with ABE for many years – he retired in July.

## "We will miss them all but wish them the best in their new endeavors!"

Following up on these departures and that of Dr. LaShan Hendrix, we have recently hired two new faculty members, Drs. Seungil Kim and Dong Chen, who you can also read about later in this newsletter. And we have two faculty positions open. I am very hopeful that we will be at full strength early in 2025. Finally, I would be remiss if I didn't mention that Dr. Jason Keith, Dean of the Bagley College of Engineering, left MSU to become Provost at Iowa State University this past summer. So, while a search is ongoing, Dr. Robert Green is serving as Interim Dean to maintain the college's momentum. As a retired Navy Captain, Robert will steer the BCoE ship until a permanent replacement can be found.

Regarding change, if you came through ABE back in its Howell Hall days, you may remember that it housed some historical agricultural equipment like an old Bailor tractor. With the move to the J. Charles Lee Agricultural and Biological Engineering Building in 2008, we had to move all that old equipment into storage on North Farm. We are presently changing storage buildings there, so we felt like it was a good time to donate some of that old equipment. For example, the Bailor tractor went to the Mississippi Agriculture Museum (See page 9). We also had gin equipment that went to Green Frog Farm - Cotton Museum of the South in Tennessee.

Moving onto a few recent occurrences, ABE students have attended multiple conferences this year (see page 8). Three undergraduate students attended the ASABE Annual International Meeting in Anaheim, CA, in July. Their travel was covered mainly by an award our student group received as ASABE's Up-and-Coming Student Club in the southeastern region. Numerous ABE graduate students also attended, supported by their major professors' research grants. Five undergraduate students attended the BMES Conference in Baltimore in October (See page 8) **They were supported by very generous donations from ABE** *alumni.*  We also had two undergrads and one grad student attend the AgGateway Annual Meeting. The two undergrads were recipients of AgGateway's "Gateway to Ag Careers" award, and the grad student was supported by other external funds. I consider these high-impact learning experiences, the kind of thing we really want to support for our students development and networking. If you would like to give to this cause, please use the **QR code**. Speaking of students, MSU just set a new enrollment record, with 23,150 students. Part of that growth includes new ABE grad students; we have gone from roughly 30 to 50 graduate students in the last four years. Directly related to that, ABE's research grants have more than quadrupled in 4 years, to over \$4M. If you have been keeping up with ABE Social Media, you will have seen that several ABE faculty members have been awarded large grants for their research (See page 7). Among many kudos I could share, I want to note that this year's Miss MSU is senior biomedical engineering major Khaoula Kamal of Tupelo.

Finally, I've mentioned several times here that we're developing an endowed scholarship in honor of Courtney Yates, a first-generation ABE student who passed away just before graduation in 2021.

The scholarship will give preference to other firstgeneration students, and we need a little over \$15,000 to complete the endowment. I have identified a source of matching funds to help. If we can get \$10,000 in donations, the donor will match \$5,000 to complete it. Please use the QR code at the bottom to give as you are able.

### Richest blessings to all of you as we approach the holiday season!

J. Alex Thomasson, Ph.D. ABE Department Head & Professor

#### Donate to ABE

advancement fund!

Donate to Courtney Yates Scholarship!



#### Dr. Joel Paz

## Can you share a memory from your time at MSU? Perhaps a notable experience with a student?

My daughter graduated from MSU in 2019. At the commencement ceremony, Dr. Keenum shook her hand and asked her, "Is your father Dr. Joel Paz?" She said "Yes, sir." I thought that was very cool. Also, in Fall 2014, I was teaching Land Surveying, and I had a lab in the afternoon around mid-November. A few students missed the lab, and around 5 P.M. I received a text message from a student. "Hi Dr. Paz, sorry we missed lab today." He included a picture of a deer that he shot. I chuckled.

#### What do you hope to see for ABE's future?

I think the department is well-positioned to address major issues in agriculture, food security, health, and biomedical research. I anticipate a steady increase in student enrollment. I would like to see each program (BME, BSE, and AETB) be nimble and flexible – to be able to change the curricula or add relevant courses (and delete inapplicable courses) that prepare students to meet the needs of our country. Courses like circular economy, environmental impact assessment, and biomedical entrepreneurship might be added. Excellent degree programs will attract more students. A few courses might need to be replaced.



The process of curriculum modification, which requires submitting changes through the University Committee on Courses and Curricula (UCCC), results in slow turnaround.

#### What are your post-retirement plans?

I don't have a grand retirement plan. The important thing to me and my wife is to stay healthy, so perhaps we'll focus on strength training. My wife and I would like to visit several state and national parks and hike some trails. We'll do a bit of international travel, spending more time in Japan and the Philippines. I was fortunate to have spent almost two months in Israel when I participated in a post-graduate irrigation technology and desert research program at Ben-Gurion University in 1992. I would very much like to visit Israel again. It would also be nice to visit Turkey, Greece, Macedonia, and Spain. We'd like to visit Ephesus, Corinth, Thessalonica, and other ancient cities where the apostle Paul preached. It is said that learning doesn't stop. I'd like to learn new things, like the Japanese and Italian languages; maybe learn sign language; read more books. I like reading books on military strategy and the history of warfare. The battle of Leyte Gulf was such an important naval battle in WW2, and the Battle of Incheon (Korean War) was, in my mind, a masterstroke by General Douglas McArthur.



#### Dr. Filip To

## *Can you share a memory from your time at MSU? Perhaps a notable experience with a student?*

My best memory from my time at MSU includes the pleasure of meeting with parents of students and learning about their diverse backgrounds and cultures. I remember most of their names and where they were from, because many of those places I had gone before, either through my research or my other adventures. My experience here has been very good. I have experienced great collegiality and friendship. I never felt like I was competing against anyone. I have loved the positive atmosphere.

#### What do you hope to see for ABE's future?

I hope ABE can remain broad-based in its capabilities in research and course offerings, and diverse in its talents, both

in students and in faculty. It has great potential and can reach high when such a multi-talented group works together.

#### What are your post-retirement plans?

My post-retirement plan is to change my lifestyle and habits. A bad habit I have is to subconsciously drive to my office early and park at the same place. I will pick up new hobbies. My son kept his promise to buy me a Mercedes like I had always wanted when he finished college and got a job. I wasn't specific enough. He bought me a 1982 Mecedes Benz convertible, but I have to fix it myself. It has parked in my driveway for 15 years now, that is a part of my post-retirement plan, to learn how to put that car back together.

## Faculty Spotlight

#### Dr. Dong Chen

Dr. Dong Chen earned his B.Eng. in Mechanical Engineering from the University of Electronic Science and Technology of China (UESTC) in 2017 and completed his M.S. and Ph.D. in Electrical and Computer Engineering at Michigan State University (MSU) in 2020 and 2023, respectively. From 2023 to 2024, he served as a Postdoctoral Fellow at the University of Virginia (UVA), affiliated with the Environmental Institute, Link Lab, and the Department of Computer Science. Dr. Chen also gained research experience as an intern at Argonne National Lab (2023, 2024) and industry experience as a Software Engineer Intern at T-Mobile in 2020.

His research is focused on agricultural applications, and he has published over 20 articles in reputable journals like Computers and Electronics in Agriculture and IEEE Robotics and Automation Letters. He holds two U.S. patents and serves as a reviewer for several journals. Dr. Chen is a member of the Institute of ASABE (American Society of Agricultural and Biological Engineers) and IEEE (Institute of Electrical and Electronics Engineers.

Dr. Chen joined ABE as an assistant professor in October 2024. His teaching and research will involve agricultural robotics, including artificial intelligence (AI), sensing, and mechatronics. He plans to mentor students in solving engineering challenges in this field. Specific focus areas include reinforcement learning (RL) for optimal decision-making in dynamic environments, with applications in autonomous vehicles, crop management, and robot control. His work on multiagent systems (MAS) explores the coordination of autonomous agents, while his computer vision research includes weed and crop recognition, animal monitoring, image generation, fruit detection, and plant phenotyping.

#### Dr. Seungil Kim

Dr. Seungil Kim joined ABE as an assistant professor in September 2024, having earned a B.S. in Chemical Engineering (CHE) at Konkuk University and an M.S. in CHE at Sungkyunkwan University (both in Korea). He earned a Ph.D. in Biomedical Engineering at University of Manitoba (Canada) and conducted postdoctoral research at University of Pittsburgh. Dr. Kim has extensive knowledge of and experience with polymeric biomaterials and medical devices. His research at MSU will serve as a platform for nurturing and advancing the next generation of researchers. He is currently teaching ABE 4523/6523 Biomedical Materials.

His teaching and research will focus on structureproperty-function relationships of biomedical biomaterials. He is involved in multiple projects related to cardiovascular and neurovascular diseases. His research on bioabsorbable embolization systems for treating cerebral aneurysms has been supported by the Brain Aneurysm Foundation for the past two years.

Dr. Kim is also leading research to develop wireless, stimuli-responsive drug delivery systems, with potential applications in medical devices for monitoring and treating infectious diseases, as well as in miniature robots for on-demand drug release targeting multiple pathogens. He collaborates with researchers at several other universities including University of Pittsburgh, Columbia University, Wichita State University, and the University of Waterloo. Dr. Kim is actively involved in patenting his research findings.



## Student Spotlight

#### **Undergraduate students**



Annemarie Coatney is a BME junior who plans to use the biological knowledge and engineering skills of her major to pursue a career in environmental health and preservation. The transition from the medical field to the environmental was fueled largely, she says, by the environment-focused REU (research experience for undergraduates) she completed last summer in the Biosystems Engineering Department at Auburn University. The medical field still holds great interest for her, as she has been developing 3D printed bone scaffolds in Dr. Lauren Priddy's biomedical lab during most of her undergraduate studies. In addition to research, she spends time organizing, planning, and fundraising for an international infrastructure project as President of Engineers Without Borders. In her personal time, she is an avid reader, an inprogress German linguist, and a self-professedly terrible but enthusiastic, crocheter.



Karly Mims is a BSE senior from Tuscaloosa, AL. Throughout her life, she has immersed herself in military history and culture, because many of her family members have served. She has recently developed a passion for nuclear and bio-based physics. This passion, coupled with her military interests, led her to double major in Biosystems Engineering and Mechanical Engineering (ME). She knew these degrees, when combined, would give her a wide range of employment opportunities with the military. She recently worked for the Air Force Civilian Service at Joint Base Anacostia-Bolling, through the Premier College Intern Program (PCIP), aiding the Department of Defense in Environmental and Mechanical sustainability projects around the installation with the. Ultimately, she hopes to use her degrees to commission into the military as an officer. She is thankful to ABE, ME, and the Bagley College of Engineering for making all this possible.



Roshan Thapa, from Nepal, is a senior in AETB with a concentration in Natural Resources and Environmental Management. Throughout his time at MSU, he has worked on various research projects, and has completed two internships that further shaped his professional development. His first internship was with EnPower Solutions, where he worked on a project to develop "Agrivoltaics" farms on solar energy sites. Most recently, he worked as an Engineering Intern with Perdue Agribusiness in Salisbury, MD, focusing on producing acid oil from soap stock generated at a soybean oil refinery. As a result of this internship, he received a full-time job offer from Perdue, where he will join as a Project Manager in grain operations after graduation.

#### **Graduate students**



Mohammadali Monfared, a BME Ph.D. student from Iran working under Dr. Taebi, is conducting pioneering research on congenital heart disease screening. He integrates Seismocardiogram signals with finite element modeling and digital twin technology to improve heart disease diagnosis accuracy. Monfared's expertise extends to Fluid-Structure Interaction and Computational Fluid Dynamics, and he's published a journal article on blood flow simulation in the heart during systole. He's currently supervising four undergraduate students working on CFD simulations of blood flow in cerebral arteries with aneurysm defects, exploring two treatment methods: Clipping and Coiling. Monfared's work is funded by the National Science Foundation. He has two accepted papers and a poster presentation at IMECE (ASME's International Mechanical Engineering Congress & Exposition) in Portland in November.



Amrit Shrestha, who hails from Nepal, will graduate in Fall 2024 with a Ph.D. in BSE. With a B.S. in mechanical engineering and an M.S. in agricultural engineering, he joined ABE in Fall 2020. Under Dr. Thomasson's supervision, his research has focused on developing methods for early season cotton yield estimation based on UAV remote-sensing images and artificial neural networks (ANNs), aiming to improve crop management for farmers. He created a modular ANN model that integrates weather information along with UAV images, from which he developed techniques to estimate plant height. He presented his research in April at National Harbor, MD, at an annual conference of SPIE (Society for Optics and Photonics). Amrit is as an innovator who is committed to leveraging AI for positive impacts in agriculture and environmental management.



J. Cooper Little earned his B.S. in AETB in May and now is working towards an M.S. degree under Dr. Mary Love Tagert. As he grew up in Hernando, MS, Cooper's dad worked in agriculture, and Cooper has always enjoyed it. Before he came to college, he knew he didn't want a desk job, and agriculture provided a way to spend time working outside. He chose the Precision Agriculture (PA) concentration because he saw PA as agriculture's future, combining the latest technology with established practices to make tried and true farming methods even more productive and profitable. His research focuses on cropping management systems to reduce Iron Deficiency Chlorosis (IDC) symptoms in soybeans. He hopes his results will enable farmers to readily identify management zones and apply best management practices to areas with IDC.



## **Our Impact**

**Over 430 undergraduate students** AETB: 103 BME: 313

**BSE: 14** 



) **50 graduate students** AETB: 11

BME: 9

BSE: 30

#### 60 graduates in Spring 2024

AETB: 17 BME: 41 BSE: 2

#### Career success after graduation

(employed, continuing education, serving military):

#### AETB Career Outcome: 100%

**BE Career Outcome: 100%** 

**BME Career Outcome: 93%** 



## Our graduate students are winning...

**Sushma Perati:** 2nd place poster presentation in Fall 2024 Graduate Research Symposium, MSU, Oct 5 2024.



**Rejane Paulino:** 2nd place poster presentation in MS Water Resources Conference, Oct 9-11 2024.

## New Research Projects



#### PI Dr. Amirtaha Taebi

**Project**: Chest Vibrations as Markers of Critical Congenital Heart Defects: Characterization, Genesis, and Clinical Significance Award: ~\$600,000

CAREER National Science Foundational





#### PI Dr. Vitor Martins

**Project**: Global Algal Bloom Detection System for Nearshore Coastal Waters using Harmonized Landsat-Sentinel-2 data. Award: ~\$235,000 *NASA Early Career Investigator (ECIP) in Earth Science* 





*PI Dr. Nuwan Wijewardane*  **Project**: POTENTIALS (advancing sPectroscOpic TechniquEs for iN siTu soll heALth assessmentS). Award: \$750,000 *USDA National Institute of Food and Agriculture* 





PI Dr. Steven Elder Project: A novel approach to ultralong sustained delivery of punicalagin as a potential treatment for osteoarthritis Award: ~\$392,000 National Institutes of Health





#### PI Dr. Xin Zhang

**Project**: Perception-Aware Soft Robot Manipulation and Bipedal Locomotion for Fresh Market Caneberry Harvestting Award: ~\$1,000,000 *USDA National Institute of Food and Agriculture* 



## **Traveling** with ABE



#### 2024 ASABE Annual International Meeting

July 28-31, 2024 -Anaheim, California

**2024 BMES Annual Meeting** October 23-26, 2024 Baltimore, Maryland





**IEEE Engineering in Medicine and Biology Society (EMBS) International Conference on Body Sensor Networks** Chicago, Illinois, October 15-17, 2024



2024 Mississippi Water Resources Conference October 9-11, 2024, Flowood, MS





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