

SPRING 2026 GRADUATE RESEARCH SYMPOSIUM

October 16, 2026
Union Ballroom

Poster Presentations
Union Ballroom S and U
Flash Talks
Union Ballroom M



MISSISSIPPI STATE UNIVERSITY™
GRADUATE STUDENT ASSOCIATION



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SCHEDULE

Session Time	Flash Talks – Ballroom M	Posters – Ballroom S & U
9:00 – 10:00 AM	Agriculture and Life Sciences (F1)	Natural Sciences in Arts and Sciences (P1)
10:15 – 11:15 AM	Natural Sciences in Arts and Sciences (F2)	Agriculture and Life Sciences (P2)
11:30 – 12:00 PM	Flash Networking	
12:00 – 1:00 PM	Lunch Break	
1:00 – 2:00 PM	(1-1:10 PM) Humanities (F3) (1:15 – 2:15 PM) Engineering (F4)	Forest Resources and Veterinary Medicine (P3)
2:15 – 3:15 PM	Engineering (F5)	Humanities (P4)
3:30 – 4:40 PM	Forest Resources and Veterinary Medicine (6)	Engineering (P5)



Flash Talks

Session Name: F1 - Agriculture and Life Sciences Flash Talks

9 AM – 10:00 AM

Judges:

Dr. Ling Li, Dr. Bashiru Adams, Dr. Cory Gallo, Dr. Angelica Abdallah

Moderators:

1. Achini Ovitigala
2. Md Insiat Islam Rabby

Presenter:

1. Afra Anan Bhuiyan, ab5056, PhD, Plant and Soil Science, *Thimet Oligopeptidase-Dependent Redox Signaling Shapes Systemic Acquired Resistance in Arabidopsis thaliana*
2. ALDWIN MENDOZA, alm1498, Master's, ASPP-CALS, *Plant-Parasitic Nematodes in Mississippi Soybean Production: A Growing Threat to Yield and Sustainability*
3. Edirisa Juniour Nsubuga, en344, PhD, Biochemistry, Nutrition and Health Promotion, *Sequential Mediation Effects of First Feeding Practices and Early Breastfeeding Initiation on the Relationship Between Prenatal Exclusive Breastfeeding (EBF) Intentions and EBF at 5 Months: A Prospective WIC ITFPS 2 Study*
4. Jon Corser, jkc465, PhD, Agricultural Science and Plant Protection, *New Targets for Spray-Induced Gene Silencing for Weed Control*
5. Larry Leon-Medina, lal494, PhD, Animal and Dairy Sciences Department, *Phenotypic Classification of Kiko Goats Based on Parasite Burden, Health Indicators, and Growth Performance During a Two-Year Grazing Trial in South Mississippi: A Multivariate Approach*
6. Leonid Carlos Moises, lcm483, PhD, Agricultural Sciences and Plant Protection, *Dynamics of the herbicide Bicyclopyrone in cereal rye (*Secale cereale* L.) straw*
7. Michelle Roy, mkr334, PhD, Biochemistry, Nutrition and Health Promotion, *Permeability and Developmental Responses of Fowler's Toad (*Anaxyrus fowleri*) Embryos to Cryoprotectants*
8. Mohan K. Bista, mkb621, PhD, Plant and Soil Sciences, *Genotype × Environment Interaction and Multi-Trait Stability of Cotton*
9. Oluwadamilare E. Oloyede, oeo25, PhD, Plant and Soil Sciences, *Tailwater recirculation reduces methane emissions in irrigated rice production systems*

10. Pankaj Prashad Joshi, ppj20, PhD, Plant and Soil Sciences, *Regenerative Practices Mitigate Greenhouse Gas Emissions in Corn Production*
11. Santosh Rajbanshi, Sr2238, PhD, Geosciences, *Compartmentalization of Rare Earth Elements in Soil-Plant-Water Systems*
12. Trisa Das, TD1311, Master's, Agricultural Science and Plant Protection, *Are Phenolic Compounds Promising Bioherbicides for Palmer Amaranth in Soybean?*

Session Name: F2 - Natural Sciences in Arts and Sciences Flash Talks

10:15 AM – 11:15 AM

Judges:

Dr. Yueran Zhuo, Dr. Taylor Heckman, Dr. Enock Amoateng

Moderator:

1. Md Insiat Islam Rabby
2. Jitka Elizarraras

Presenter:

1. Anh Ta, alt716, PhD, Chemistry, *Predictive in Silico Screening for Potential (Eco)Toxicity of Ionic Liquids and their Decomposition Products: Preliminary Results and Paths Forward*
2. Chibuike Onyeogulu, co584, PhD, Chemistry, *Temperature-dependent Pyrolysis Products of Ionic Liquids*
3. Edward Akuffo Addo Dankwa, ea80, PhD, Mathematics and Statistics, *A Count Time Series Model With Change-point Considerations*
4. Mohammad Alizadeh Poshtiri, ma2124, PhD, Physics and Astronomy, *Speckle free label free imaging of biological cells and tissues using random laser illumination*
5. Samar Ghanam, shg108, PhD, Physics and Astronomy, *Compact Fermion to Qubit Encoding for Quantum Simulation*
6. Suprabhat Paramanick, sp2402, PhD, Chemistry, *Core–Shell Perovskite Fibers Integrating Dual-Color Emission, Random Lasing, and Speckle-free Imaging*
7. W.D. Thushni Sadana Wickramaratna, wtw177, PhD, Chemistry, *Synthesis and Characterization of DMDPP-Based Vinyl Flanked Conjugated Polymers for Conductive Materials Applications*

Session Name: F3 - Humanities in Arts and Sciences, Education, Business, and Architecture, Art and Design Flash Talks

1:00 PM - 1:10 PM

Judges:

Dr. Daniel Kuzmich, Dr. DeeDee Baldwin, Dr. Nathan Hammond, Dr. Soyoun Lim,
Dr. Jenna DePasquale

Moderator:

1. John Michael Lane
2. Adi Singh

Presenter:

1. Gbenga I. Elufisan, gie3, PhD, Department of Sociology, *Farming While Retired: Black Farmers' Effort to Keep Legacy Alive*
2. MD SAIFUL HASAN, MH3607, PhD, Department of Sociology, *Choosing Pets, Choosing Selves: Pet Preference and Identity Negotiation among College Student Pet Owners*
3. Yulia Kizner, ik161, PhD, Kinesiology, *College Students and Pickleball: Motivations for Participation*

Session Name: F4 - Engineering Flash Talk 1

1:15 – 2:15 PM

Judges:

Dr. Carmen Sescu, Dr. Sheida Riahi, Dr. Walaa Alqwider

Moderator: Andrew Hoffman

Presenter:

1. Yehani Ekanayake, yte5, PhD, Agricultural and Biological Engineering, *Spectroscopic Prediction of Biological Soil Health Indicators Across Different Soil Preparation Conditions*
2. Marionei Fomaca de Sousa Junior, mf1521, PhD, Agricultural and Biosystems Engineering, *A Scalable Framework Coupling SWAT+ and Machine Learning for Continuous Water Quality Estimation*

3. Zeenat Islam, zi28, PhD, Computer Science and Engineering, *Temporal Characteristics of Vision in Virtual Reality*
4. Diego Alejandro Galindo, dg1668, Master's, Civil Engineering, *The Role of Event Selection in Optimizing Curve Number Calibration*
5. Md Masiat Roushan Masrafee, mm5230, PhD, Agricultural and Biological Engineering, *Autonomous plastic debris retrieval in cotton fields: integrating GNSS navigation, computer vision, and robotic manipulation on an Amiga platform*
6. Cheng Ouyang, co603, PhD, Agricultural & Biological Engineering, *Deep Reinforcement Learning-Enhanced Event-Triggered Data-Driven Predictive Control for a 3D Cable-Driven Soft Robotic Arm*
7. Mahfuzur Rahman, mr2527, PhD, Electrical and Computer Engineering, *Pedestrian Tracking and Trajectory Prediction Using YOLOv11 and a Goal-Conditioned LSTM Integrated with ByteTrack and ReID for Intersection Navigation*
8. Sumaira Kutub, sk2134, PhD, Biomedical Engineering, *Design and Fabrication of PEDOT Nanoparticle Sol-Gel System for Electroresponsive Drug Delivery*

Session Name: F5 - Engineering Flash Talk 2

2:15 – 3:15 PM

Judges:

Dr. Hussein Gharakhani, Dr. In Kyu Jeon, Dr. Mohammad Khalid

Moderator:

Presenter:

1. Thainara Lima, tml411, PhD, Agricultural and Biological Engineering, *Scales of observations: the power of high-resolution sensors in mapping nearshore seaweed in the Greater Antilles*
2. Zack Murphy, zcm58, PhD, Agricultural and Biological Engineering, *Investigating the effects of hormonal birth control on cognition*
3. Moeen Ul Islam, mu136, PhD, Agricultural and Biological Engineering, *Spatially Weighted Radiometric Calibration Using Automated Ground Control Points for UAV Agricultural Imagery*
4. Amirhossein Eskorouchi, ae1028, PhD, Industrial and Systems Engineering, *UOT-DETR: Distributionally Constrained Visual Quality Measurement with Unbalanced Optimal Transport for Wood-Chip Size Estimation*

5. Iffat Ara Ebu, ie93, PhD, Electrical and Computer Engineering, *Identity-consistent multi-object tracking via Interacting Multiple Model Kalman filtering for fish species monitoring*
6. Achini Ovitigala, ao746, PhD, Physics and Astronomy, *A Novel Laser-Photolysis Cavity Ringdown Spectroscopy Design for Absolute Absorption Cross-Section Measurements of BrHg Radicals*
7. Linyuan Wang, lw1789, PhD, Agricultural & Biological Engineering, *Active Learning-Based UAV Image Annotation and Orthomosaic Mapping for Precision Agriculture*
8. Kodai Watanabe, kw2597, Master's, Agricultural & Biological Engineering, *A Comparative Study of 3D Reconstruction Pipelines and Their Impact on the Simulation-to- Reality Gap in Cotton Boll Detection*
9. Amir Hossein Ebrahim Pour, Ae1045, PhD, Mechanical Engineering, *Impact-wrench performance verification: challenges in measuring torque under realistic test conditions*
10. Mohammad Shamoushaki, ms4493, PhD, Agricultural and Biological Engineering, *Learning from Demonstration for Robotic Fruit Approach Under Partial Occlusion*
11. Prachi Pannu, pp910, Master's, Agricultural and Biological Engineering, *Development of Kartogenin-Loaded Electrospun PCL-PLGA Scaffolds for enhanced Microfracture Repair*
12. Asifur Rahman, ar2935, PhD, Agricultural and Biological Engineering, *RTK-GNSS-Based Waypoint Navigation of a Husky A300 UGV for Precision Soil Sampling*

Session Name: F6 - Forest Resources and Veterinary Medicine Flash Talk

3:30 – 4:40 PM

Judges:

Dr. Sheida Riahi, Dr. Galen Collins, Dr. Toufiq Ul Amin, Dr. Jenna DePasquale

Moderator:

1. Khadija Tahsin Nisa
2. Remi Sheibley

Presenter:

1. Aadarsha Lamichhane, al2409, PhD, Department of Sustainable Bioproducts, *Making Every Strand Count: Creating Structural Value from Underutilized Wood Resources*

2. Arun Kuttoor Vasudevan, ak2089, PhD, Sustainable Bioproducts, *Topology-Inspired Optimization of Engineered Wood Beams with Curved Corrugated Cores.*
3. Autumn Pecarovich, afp114, PhD, Forestry, *Beyond the Adaptive Cycle: Drought, Frost, and Defoliation Impact Seedling Physiology Under Novel Disturbance Regimes*
4. Kendall N. McKinnon, knm452, PhD, College of Veterinary Medicine (Department of Comparative Biomedical Sciences), *Differential In Vivo Sensitivity of Serine Hydrolases Following Chlorpyrifos-oxon Exposure in Juvenile Rats*
5. Khadija Ferdous, kaf432, PhD, Clinical Sciences, *Antibiotic Effects on the Canine Gut Resistome and E. coli Dynamics: A Longitudinal One Health AMR Study*
6. LYDIA OGEBULE, Lao92, PhD, Comparative Biomedical Sciences, *Oxime 20 Preserves Mitochondrial Integrity Following Organophosphate-Induced Calcium Overload in B35 Cells*
7. Muhammad Hamza, mh3497, PhD, Department of Sustainable Bioproducts, *Removing the Unremovable: Cellulose Changed Water's Story*
8. Muhammad Husnain Manzoor, mm5242, PhD, Department of Sustainable Bioproducts, *Heterogeneous catalytic conversion of glucose into 5-hydroxymethylfurfural (HMF) using Fe₃O₄/SiO₂-Al₂O₃ magnetic catalyst*
9. Nkolika Omoni, nbo20, PhD, Sustainable Bioproducts, *Effects of Wildfire on Wood Properties of Surviving Ponderosa Pine in Plumas National Forest*
10. Olawale Ajisafe, oma50, PhD, Comparative Biomedical Science, *Evaluating CYP450 and Transporter-Mediated Drug Interaction Potential of Novel Oxime 20*
11. Samadhi Nisansala Nawalage, snn99, PhD, Sustainable Bioproducts, *Effects of Steam Activation on the Structure and Performance of Pine Sawdust Derived Biochar Supported Graphene Shelled ZeroValent Iron Nanoparticles*
12. Samjhana Panthi, sp2361, PhD, Department of Forestry, *Drivers of forest management expenditures among non-industrial private forest (NIPF) landowners in Mississippi*
13. Sashank Khaniya, sk2115, PhD, Department of Forestry, *How crowded can U.S. Mixed Forests get? Exploring the Drivers of the Maximum Size–Density Relationship*
14. Sharon Samuel, sds694, PhD, Pathobiology and Population Medicine, *Why biosecurity breaks down: a systems view of HPAI prevention in commercial egg farms*
15. Sujita Balami, sb3726, PhD, College of Veterinary Medicine, *Prime-boost vaccination with live attenuated edwardsiella vaccines confers protection against experimental e. Piscicida challenge in hybrid catfish*

Poster Sessions

Session Name: P1 - Natural Sciences in Arts and Sciences Poster Session

9 AM – 10:00 AM

Judges:

Dr. Yukai Ai, Dr. Enock Amoateng, Dr. Christopher Goden

Moderator:

1. Sam Dykes
2. Kendall McKinnon

Presenter:

1. Olalekan Olabode, oao59, PhD, Chemistry, *Fabrication of Redox Active Mn₃O₄ on Douglas Fir Biochar for Aqueous Arsenic(III) Oxidation and Remediation*
2. Subha Raut, sr2120, PhD, Mathematics and Statistics, *Same Loss, Same Noise, Opposite Schedules: Noise Structure and Optimizer Normalization Jointly Determine Whether Learning-Rate Cooldown Helps*
3. Subham Singh, ss4707, PhD, Mathematics and Statistics, *Relative Positions Generalize, Absolute Positions Memorize: An Implicit-Bias Account of Length Generalization in Attention.*
4. Suprabhat Paramanick, sp2402, PhD, Chemistry, *Core–Shell Perovskite Fibers Integrating Dual-Color Emission, Random Lasing, and Speckle-free Imaging*

Session Name: P2 - Agriculture and Life Sciences Poster Session

10:15 AM – 11:15 AM

Judges:

- Posters 1 to 5 – Dr. Bashiru Adams, Dr. Cory Gallo, Dr. Shankar Ganapathi Shanmugam
- Posters 6 to 10 – Dr. Jiaxu Li, Dr. Tibor Pechan, Dr. Yueran Zhuo
- Posters 11 to 15 – Dr. JuYoung Lee, Dr. Angelica Abdallah
- Posters 16 to 20 – Dr. Vitor Martins, Dr. Galen Collins, Dr. Madhav Dhakal
- Posters 21 to 24 – Dr. Hala El Daous, Dr. Amanda Patrick

Moderator:

1. Sam Dykes
2. Matthew Lentz

Presenter:

1. Abhishek Panchadi, ap2881, PhD, Plant and Soil Sciences, *Discovering Soil Organic Carbon Spectral Indices Using an Uncertainty-Aware Genetic Algorithm*
2. Alekhya Chakravaram, ac3949, PhD, Plant and Soil Sciences, *Whole-Plant Digital Phenotyping to Identify Heat-Tolerant Rice Genotypes*
3. Alok Sinha, as5430, PhD, Plant and Soil Sciences, *Optimizing Biochar Use in Rice Production for Soil Health and Environmental Sustainability: A Global Meta-Analysis*
4. Andre C. Castro, acc960, Master's, Biological and Agricultural Engineering, *Scaling very high resolution land cover mapping: a VLM-in-the-Loop, active learning approach*
5. Bhawana DC, bd1210, Master's, Plant and Soil Sciences, *Balancing Act: Impact of Heat and Drought on Soybean Yield and Nutrition*
6. Bipin Bastakoti, bb3014, PhD, Plant and Soil Sciences, *Can Fine-Tuned Segment Anything Models Enhance Crop Mapping Using EnMAP Hyperspectral Imagery?*
7. Chami Rampati Dewage, cyr22, Master's, Plant and Soil Sciences, *Salinity Tolerance of Soybean across Growth Stages*
8. Edirisa Juniour Nsubuga, en344, PhD, Biochemistry, Nutrition and Health Promotion, *Sequential Mediation Effects of First Feeding Practices and Early Breastfeeding Initiation on the Relationship Between Prenatal Exclusive Breastfeeding (EBF) Intentions and EBF at 5 Months: A Prospective WIC ITFPS 2 Study*

9. Etseoghena Oladejo, ejo75, PhD, School of Human Sciences/Human Development and Family Science, *Family coping and child behavioral adjustment in families with parental alcohol problems*
10. Leticia Mendes, llm418, Master's, Agricultural and Biological Engineering, *Accelerating Building Detection via Geospatial Foundation Model Embeddings in High-Resolution Imagery*
11. Manoj Kumar Reddy Allam, ma2129, PhD, Plant and Soil Sciences, *Impact of Salinity Stress on Leaf Pigments, Yield, and Grain Nutrition*
12. Mohamed Naziq, mn1002, PhD, Agricultural and Biological Engineering, *Simulating Soil Water Dynamics Under Conventional and Regenerative Agricultural Practices to Support Improved Furrow Irrigation Management in the Lower Mississippi Delta*
13. Mohammad A. Ghanbari, mg2251, PhD, Institute for Genomics, Biocomputing & Biotechnology, *System-level integration of phenomics, metabolomics, and proteomic responses in cowpea genotypes under early-stage drought stress reveals mechanisms of resistance*
14. Mohan K. Bista, mkb621, PhD, Plant and Soil Sciences, *Beyond Leaves: Cotton Bract Physiology Under Drought Stress*
15. Pankaj Prashad Joshippj20, PhD, Plant and Soil Sciences, *Evaluating Protected Nitrogen Application Practices in Mitigating Greenhouse Gas Emissions*
16. Prathiksha Raghava, pr686, PhD, Plant and Soil Sciences, *Evaluating Groundwater Sustainability Under Agricultural Water Use in the Mississippi Delta*
17. Rachel Marie Bobo, rmb539, PhD, Plant and Soil Sciences, *Gibberellin biosynthesis inhibitor Ancymidol restricts growth of Streptocarpus hybrids*
18. Rodgers Kabenomuhangi, rk1024, PhD, Agricultural and Biological Engineering, *Simulating the Impacts of Regenerative Agriculture on Runoff and Infiltration in the Big Sunflower River Watershed*
19. Sadie Studdard, ss4378, Master's, Biochemistry, Nutrition, and Health Promotion, *Providing Universal School Meals Can Reduce Food Insecurity: A Policy Review of the Community Eligibility Provision in Mississippi*
20. Sandesh Gauli, sg2283, Master's, Agricultural Science and Plant Protection, *The Path to Improved Disease Management: Understanding Fusarium Storage Rot in Mississippi Sweetpotato*
21. Santee Ezell, se126, PhD, School of Human Sciences, *From High School to Higher Education: Family Engagement Among Rural Mississippi Families*
22. Shreeya Adhikari, sa2036, PhD, Agricultural Science and Plant Protection, *Flight Capacity and Migration Potential of the Soybean Looper in Mississippi Cropping Systems*

23. Sristi Subedi, ss4886, Master's, Biochemistry, Nutrition and Health Promotion, *Community-engaged Learning in Health Promotion*
24. Sujana Poudel, sp2379, PhD, Plant and Soil Sciences, *Identification of Genomic Regions Associated with Yield Traits in Cowpea*

Session Name: P3 - Forest Resources and Veterinary Medicine Poster Session

1:00 PM - 2:00 PM

Judges:

- Posters 1 to 5 – Dr. Young Kyung Park, Dr. Taylor Heckman
- Posters 6 to 10 – Dr. Suraj A. Yadav, Dr. Toufiq Ul Amin
- Posters 11 to 15 – Dr. Amanda Patrick, Dr. Sara Vick

Moderator:

1. Honor Elchos
2. S. M. Rakifull Alam

Presenter:

1. Aliaa Ismail, ai328, PhD, Comparative Biomedical Sciences, *A Xenobiotic-Responsive Pathway That Improves Cutaneous Wound Repair: Pregnane X Receptor (PXR) as a Regulator of Fibroblast Function*
2. Amos Olakanmi Olowookere, aoo73, PhD, Comparative Biomedical Sciences, College of Veterinary Medicine, *chp; a Pentose Phosphate Pathway gene determines Listeria monocytogenes fitness in-vitro and virulence in-vivo*
3. Anthony Obinna Umeojiakor, aou3, PhD, Forestry, *Examining the Response of Upland Oak Regeneration, Recruitment and Overstory Growth to Midstory Herbicide Injection in Hardwood Forests of Northern Mississippi.*
4. Anusha Shrestha, as5385, Master's, Forestry, *Effects of Coastal Flooding and Storm Surge on Wood Product Demand in the United States*
5. Ayushma Sharma, as5338, PhD, Wildlife, Fisheries and Aquaculture, *Evaluating the Safety of Dietary and Injectable Antibiotic Therapies in Catfish Broodstock*
6. Dalila Belaidi db3049, PhD, Sustainable Bioproducts, *From Veneer Sorting to Structural Performance: Integrating Nondestructive Testing and Finite Element Modeling for Red Maple LVL*
7. Elizabeth Esser, eae197, PhD, Forestry, *Potential of Harnessing Autotoxic Extracts to Control Invasive Cogongrass Growth*

8. Eryn Fleming, emf277, PhD, Pathobiology and Population Medicine, *Investigation of Environmental Factors Associated with Total Microcystin Concentrations in Farm-Raised Hybrid Catfish (♀ Channel × ♂ Blue) Ponds.*
9. Evan G Moore, egm193, Master's, Forestry, *Spatial Optimization of Prescribed Fire to minimize Wildfire Incidence in Mississippi*
10. Hemraj Kathayat, hk725, PhD, Comparative Biomedical Sciences, *The Conserved Tripartite RND Efflux Pump AcrBAR-TolC Governs Growth Fitness, Biofilm Formation, and Antibiotic Resistance in Edwardsiella ictaluri*
11. Manal Bouchlouch, mb4199, PhD, Sustainable Bioproducts, *Listening for Gaps: Nondestructive Evaluation and Bending Performance of Delaminated Glue Laminated Timber*
12. Miguel Montufar, mam2051, Master's, Wildlife, Fisheries & Aquaculture, *Evaluating Bacteremia as a Predictor of Edwardsiella ictaluri Infection Outcome in Channel Catfish (Ictalurus punctatus).*
13. Muhammad Hamza, mh3497, PhD, Sustainable Bioproducts, *Ultra-Fast PFAS Removal from Water Using a Sustainable Aerogel*
14. Nkolika Omoni, nbo20, PhD, Sustainable Bioproducts, *Effects of Wildfire on Wood Properties of Surviving Ponderosa Pine in Plumas National Forest*
15. Sharon Samuel, sds694, PhD, Pathobiology and Population Medicine, *A systems approach to understanding behavioral drivers of highly pathogenic avian influenza (HPAI) introduction in U.S commercial table-egg farms.*

Session Name: P4 - Humanities in Arts and Sciences, Education, Business, and Architecture, Art and Design Poster Session

2:15 – 3:15 PM

Judges: Dr. Rizwan Farooqui, Dr. Tae Hoon Lee, Dr. Rubaiya Zannat, Dr. Heath Anderson

Moderator:

1. Bhawana DC
2. Iffat Ara Ebu

Presenter:

1. Istiak Ahmed, ia283, Master's, Sociology, *Gendered Vulnerability and Coping with Climate-Induced Landslides among Chakma Indigenous Women in the Chittagong Hill Tracts, Bangladesh*
2. Sam Freville, M.S., snf148, PhD, Psychology, *Credibility as a mood-dependent belief: Depression, anxiety, and stress as moderators of the impact*

Session Name: P5 - Engineering Poster Session

3:30 PM–4:40 PM

Judges:

- Posters 1 to 6 – Dr. In Kyu Jeon, Dr. Christopher Goden
- Posters 7 to 11 – Dr. Lucas B. Ferreira, Dr. Sara Vick
- Posters 12 to 16 – Dr. Mohammad Khalid, Dr. Rizwan Farooqui
- Poster 17 to 22 – Dr. Hussein Gharakhani, Dr. Walaa Alqwider

Moderator:

1. Adi Singh
2. Mahmuda Alam

Presenter:

1. Abid Hassan, ah3975, Master's, Industrial Systems and Engineering, *From Injury Reports to Prevention: A Large Language Model Framework That Learns Construction Hazards from OSHA Narratives*
2. Ashan Madumal, am5163, PhD, Agricultural & Biological Engineering, *Robotic Fruit Harvesting with Vision Guidance, In-Hand Manipulation, and Continuous Transfer*
3. Bishal Adhikari, ba974, PhD, Agricultural and Biological Engineering, *Future Farming XR: An Extended Reality Command Center for Autonomous Fleet Management and Farm Supervision*
4. Chamika A. Silva, fcs51, PhD, Agricultural and Biological Engineering, *Design and prototype a modular type seeding end-effector for autonomous precise seeding*
5. Doha Bounaim, db3068, PhD, Michael W. Hall School of Mechanical Engineering, *Reliable wind power forecasting for predictable hydrogen costs JOVET framework for wind-to-hydrogen systems*
6. Honor Elchos, he206, Master's, Agricultural and Biological Engineering, *Development and characterization of 3D printed nHA/PLGA composite materials for bone scaffold engineering*
7. Iffat Ara Ebu, ie93, PhD, Electrical and Computer Engineering, *Robust Underwater Fish Tracking via IMM-Based Motion Prediction and Domain-Specific Bounding Box Association*
8. Juliana de Abreu Araujo, jd2725, PhD, Agricultural and Biological Engineering, *Mapping the Americas: Operational 10-m Agricultural Extent Mapping Using AlphaEarth Embeddings*

9. M A Batin, mb4271, Master's, Agricultural & Biological Engineering, *Bridging the sim-to-real gap in synthetic data generation for automated sweet potato grading*
10. Md Ebtidaul Karim, mk1732, PhD, Electrical and Computer Engineering, *Investigation of Machine Learning Models for Field Scale Soil Moisture Mapping via UAV-Based GNSS-R, Multispectral Camera, and LiDAR*
11. Md Masiat Roushan Masrafee, mm5230, PhD, Agricultural and Biological Engineering, *Integrated perception, coupled kinematics, and digital-twin-assisted validation of a 9-DOF dual-arm robotic manipulator for agricultural applications*
12. Md Moniruzzaman, mm5111, PhD, Electrical and Computer Engineering, *Real-time Multivariate Lifetime Prediction of IGBT Power Switches under Sensor Degradation*
13. Menaka Konara, tk831, PhD, Department of Mechanical Engineering, *From Muscle Signals to Hand Intent: Machine Learning for Finger, Action, and Force Decoding*
14. Moeen Ul Islam, mu136, PhD, Agricultural and Biological Engineering, *Argus Omnimotus: An Open-Source Modular Swerve-Drive Robot Platform for Agricultural Robotics Research and Education*
15. Mohammad Shamoushaki, ms4493, PhD, Agricultural and Biological Engineering, *Learning from Demonstration for Robotic Fruit Approach Under Partial Occlusion*
16. Montana Jane Lang, mjl495, PhD, Industrial and Systems Engineering, *Virtual Reality Simulation for Endovascular Coiling Training: Current Approaches and Development of an Immersive Training Environment*
17. Prachi Pannu, pp910, Master's, Agricultural and Biological Engineering, *Development of Kartogenin-Loaded Electrospun PCL-PLGA Scaffolds for enhanced Microfracture Repair*
18. Priyanka Paudel, pp918, PhD, Computer Science, *Visual Question Answering*
19. Ramak Nassiri, rn533, PhD, Computer science and Engineering, *Attacking Tabular Foundation Models*
20. Sumaira Kutub, sk2134, PhD, Biomedical Engineering, *Design and Fabrication of PEDOT Nanoparticle Sol-Gel System for Electroresponsive Drug Delivery*
21. Syed Mohammed Farhan, sm3955, PhD, Computer Science & Engineering, *Does Multimodal Dementia Detection Rely on Culturally-Variable Discourse Patterns? Evidence from Gating Analysis and Perturbation Testing*
22. Venkata Sai Deepak Mutta, VM656, PhD, Mechanical Engineering, *Predictive Action Refinement for Learned Robot Navigation Policies*

ABSTRACTS AND PRESENTERS



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Presenter: Aadarsha Lamichhane

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Department of Sustainable Bioproducts

Advisor: Dr. Mostafa Mohammadabadi, Assistant Professor, Sustainable Bioproducts

Title: Making Every Strand Count: Creating Structural Value from Underutilized Wood Resources

Abstract: Forest management practices such as thinning generate small-diameter trees that can be underutilized in high-value structural applications. This study investigated whether structural geometry could increase the value of underutilized small-diameter trees through the development of lightweight engineered beams with corrugated cellular cores. Southern Yellow Pine strands were formed into corrugated panels and combined with solid lumber flanges to create an engineered beam. Experimental testing and finite element modeling were used in a progressive design process to evaluate core orientation, core configuration, and corrugated geometry. An effective core orientation was first identified, followed by targeted modification of the cellular core to improve stability and load transfer. Parametric modeling was then used to refine the corrugated geometry and guide fabrication of the final beam configuration. The developed beams were evaluated under compression and short- and long-span bending and compared with conventional glulam. The final cellular beam showed competitive stiffness and load-carrying performance while maintaining a lightweight structure. These findings demonstrate that engineering the arrangement of wood strands obtained from processing small-diameter trees can increase the structural value of such underutilized wood resources and enable more efficient utilization of forest resources.



Presenter: Abhishek Panchadi

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr. Prakash Kumar Jha, Assistant Professor, Plant and Soil Sciences

Title: Discovering Soil Organic Carbon Spectral Indices Using an Uncertainty-Aware Genetic Algorithm

Abstract: Accurate estimation of soil organic carbon (SOC) from imaging spectroscopy is often limited by the sensitivity of spectral indices to wavelength selection and spectral uncertainty. In this study we employed an uncertainty-aware genetic algorithm to discover simple, stable hyperspectral indices for SOC estimation. A total of 8,711 mineral topsoil samples from the USDA Rapid Carbon Assessment spectral library were analyzed across wavelengths from 400-2400 nm. Five two-band formulations such as addition, difference, multiplication, ratio, and normalized difference were explored using evolutionary optimization. Monte Carlo spectral perturbations were incorporated into the genetic algorithm fitness function to account for measurement uncertainty. Conventional optimization identified a ratio index at 2245 and 2280 nm, whereas uncertainty-aware optimization shifted the selected wavelengths to 2220 and 2300 nm. The uncertainty-aware index maintained comparable performance on a 30% holdout dataset ($R^2 = 0.395$) relative to the conventional optimum ($R^2 = 0.397$), while demonstrating greater stability under simulated spectral perturbations. Preliminary evaluation using an independent Mississippi soil spectral dataset further demonstrated transferability of the identified SWIR wavelength relationship. These findings highlight the potential of uncertainty-aware evolutionary optimization for developing parsimonious SOC spectral indices, with future work focused on transferring these relationships to spaceborne hyperspectral observations.



Presenter: Abid Hassan

Presentation Type and Session: Poster, P5

Level of Study: Master's

Department: Industrial Systems and Engineering

Advisor: Dr. Xinchao Liu, Assistant Professor, Industrial and Systems Engineering

Co-Advisor: Dr. Rizwan Farooqui, Assistant Proferssor, Building Construction Science

Title: From Injury Reports to Prevention: A Large Language Model Framework That Learns Construction Hazards from OSHA Narratives

Abstract: Construction has the highest number of fatal work injuries of any U.S. industry, and OSHA's Severe Injury Reports contain tens of thousands of narratives describing how serious injuries occur. These narratives are rarely used for systematic analysis because they are inconsistent in wording and too numerous for manual review. This research develops a locally deployable large language model framework for construction safety analysis and measures what each of its components contributes. The framework combines supervised fine-tuning of an open-weight model on 18,464 construction records, a knowledge graph of 2,348 hazard, activity, equipment, and injury nodes extracted from the narratives, retrieval-augmented generation over that graph, and quality-controlled synthetic augmentation of rare incident classes. A five-configuration ablation on 1,893 held-out records evaluated incident classification, contributing-factor identification, and safety recommendation generation. Fine-tuning raised classification accuracy from 0% to 60.2%, and graph retrieval improved contributing-factor recall from 81.6% to 85.4%, while combining the two components reduced classification accuracy, a finding that informs how such systems should be deployed. The framework runs on a single workstation without cloud services, so contractors and insurers can analyze their own incident records to identify recurring hazards, shorten investigations, and reduce injury and claim costs.



Presenter: Achini Ovitigala

Presentation Type and Session: Flashtalk, F5

Level of Study: PhD

Department: Physics and Astronomy

Advisor: Dr. Chuji Wang, Professor, Physics and Astronomy

Co-Advisor: Dr. Theodore Dibble, Professor, Chemistry

Title: A Novel Laser-Photolysis Cavity Ringdown Spectroscopy Design for Absolute Absorption Cross-Section Measurements of BrHg Radicals

Abstract: Atmospheric oxidation of elemental mercury produces BrHg radicals, whose photochemical behavior influences mercury transport and deposition. However, quantitative interpretation of BrHg chemistry is limited by uncertainties in its ultraviolet absorption cross-sections. We developed a novel laser-photolysis cavity ringdown spectroscopy (LP-CRDS) design for sensitive, wavelength-resolved measurements of BrHg. BrHg radicals were generated by 266 nm photolysis of HgBr_2 and probed near 256 nm using a high-finesse optical cavity. The new configuration introduces the photolysis beam along the cavity axis using a wavelength-selective mirror arrangement, increasing the overlap between the photolysis and probe beams while allowing the ringdown signal to be directed toward the photomultiplier tube. This geometry is designed to extend the effective interaction length, increase BrHg sensitivity, and reduce interference from unphotolyzed HgBr_2 . This approach provides improved capabilities for quantitative studies of atmospheric mercury intermediates.



Presenter: Afra Anan Bhuiyan

Presentation Type and Session: Flashtalk, F1

Level of Study: PhD

Department: Plant and Soil Science

Advisor: Dr. Fernanda Reolon de Souza, Assistant Research Professor, Plant and Soil Science

Title: Thimet Oligopeptidase-Dependent Redox Signaling Shapes Systemic Acquired Resistance in *Arabidopsis thaliana*

Abstract: Systemic acquired resistance (SAR) allows plants to build stronger defense responses after an initial pathogen infection. However, the role of redox signaling in this process is still not fully clear. This study examines how thimet oligopeptidases, especially TOP1 and TOP2, are involved in redox regulation during SAR in *Arabidopsis thaliana*. Wild-type Col-0 and top mutant plants were studied using pathogen infection, bacterial growth assays, GRXS13p reporter imaging, and gene expression analysis. After SAR induction with *Pseudomonas syringae* pv. tomato AvrRpt2, bacterial growth was reduced in Col-0 plants, while top2 plants showed a weaker response, suggesting that TOP2 is important for proper SAR development. Reporter imaging also showed that redox responses differed depending on the treatment. Hydrogen peroxide caused a quick but short-lived response, while salicylic acid produced a stronger and longer-lasting response. Pipecolic acid responses were weaker in plants lacking functional TOP2. Pathogen treatment caused the strongest overall GRXS13 response. Glutathione monoethyl ester treatments also showed that changes in antioxidant levels can affect SAR-related redox signaling. Overall, these results suggest that TOP proteins help regulate the redox changes needed for the proper timing and development of systemic plant immunity.



Presenter: ALDWIN MENDOZA

Presentation Type and Session: Flashtalk, F1

Level of Study: Master's

Department: ASPP-CALS

Advisor: Dr. C. Liu, Assistant Professor, Agricultural Science and Plant Protection

Title: Plant-Parasitic Nematodes in Mississippi Soybean Production: A Growing Threat to Yield and Sustainability

Abstract: Soybean (*Glycine max* L. Merr.) is a major U.S. row crop supporting food, feed and biofuel industries, with Mississippi ranking 11th nationally in production and generating more than \$1.0 billion in crop value in 2025. However, intensive soybean cultivation has favored the proliferation of soil-borne pathogens that resulted to yield reduction. Diagnosis of nematode infestation remain underrecognized because of their atypical field manifestations. Through coordinated outreach involving, various platforms and collaboration with extension, research and consultants, an eight-year survey conducted from 2019 through 2026 analyzed 3,539 soil samples representing 44 Mississippi counties revealed the incidence of 12 distinct plant-parasitic nematode genera. Among the nematodes extracted and analyzed, spiral (*Helicotylenchus* spp.) and reniform (*R. reniformis*) exhibited the widest distribution, observed in 42 counties. The latter and represented the greatest proportion of samples exceeding Actionable Population Density (APD) thresholds, followed by soybean cyst nematode (*Heterodera glycines*) and root-knot nematode (*Meloidogyne* spp.). Furthermore, reniform nematode exhibited widespread distribution across Mississippi soybean fields and occurred both independently and in mixed-species infestations. However, some growers rotate soybean with cotton, which reniform remains a serious problem. These findings provide a basis for developing integrated management strategies to suppress the dominant nematode threats affecting Mississippi soybean production.



Presenter: Alekhya Chakravaram

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Raju Bheemanahalli Rangappa, Associate Research Professor, Plant and Soil Sciences

Title: Whole-Plant Digital Phenotyping to Identify Heat-Tolerant Rice Genotypes

Abstract: High temperatures during the reproductive phase threaten rice production by compromising plant health and reducing grain yield. Developing heat-tolerant, high-yielding cultivars requires rapid, precise phenotyping, for which sensor-based tools offer a promising solution. This study evaluated whether high-throughput Phenospex scanning provides greater efficiency and accuracy than handheld instruments for assessing plant health and pigment status. Six rice genotypes were grown under control (32/24°C) and heat-stress (38/24°C) conditions from flowering to physiological maturity. Pigment traits were recorded with both Phenospex and handheld devices at 7, 14, 21, and 28 days after stress (DAS) onset. Biomass and yield components were related to manually measured leaf pigments and digitally derived spectral indices, including the Normalized Pigment Chlorophyll Index (NPCl) and Plant Senescence Reflectance Index (PSRI). Heat stress reduced grain weight by 31.6% and spikelet fertility from 87.0% to 67.8% (22.1%). Reductions were smaller in REX, RT7331, and RT7521 (8.6–14.3%) than in Cll19 (39.5%), Cll16 (37.5%). Handheld chlorophyll readings correlated positively with NDVI at 14 DAS, but this relationship weakened by 21 DAS. Under heat, chlorophyll was inversely associated with NPCl ($r = -0.68$) and PSRI ($r = -0.58$). These findings support a shift from single-leaf to whole-plant digital phenotyping for tracking and selecting heat-tolerant rice genotypes.



Presenter: Aliaa Ismail

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Comparative Biomedical Sciences

Advisor: Dr. George Howell III, Professor, Comparative Biomedical Sciences

Title: A Xenobiotic-Responsive Pathway That Improves Cutaneous Wound Repair: Pregnane X Receptor (PXR) as a Regulator of Fibroblast Function

Abstract: Chronic non healing wounds remain a major clinical and economic challenge. Defective fibroblast migration, aberrant extracellular matrix remodeling, and unresolved inflammation contribute to delayed wound repair. The PXR is a xenobiotic responsive nuclear receptor known to suppress inflammation in multiple tissues, but its role in cutaneous wound healing remains undefined. This study investigates how PXR activation, by pregnenolone 16 α carbonitrile (PCN), influences pressure wound healing in vivo and dermal fibroblast function in vitro. Dorsal pressure wounds were generated in male wild type (WT) and PXR knockout (PXRKO) mice. PCN (100 μ M) or vehicle (10% DMSO) was applied topically throughout healing, and wound closure was quantified digitally. Day-4 wound tissues were analyzed by RT qPCR for pro inflammatory mediators (Il6, Tnf, Ccl2) and fibroblast activation markers (Acta2, Tgfb1). In vitro studies used primary murine dermal fibroblasts to assess migration (scratch and Boyden-chamber assays), myofibroblast differentiation, collagen synthesis, and canonical TGF- β signaling. Topical PCN accelerated wound closure in WT mice, whereas PXRKO mice showed no improvement. WT wounds treated with PCN exhibited reduced Il6, Tnf, Ccl2, Acta2, and Tgfb1 expression, indicating a shift toward a pro resolving anti fibrotic profile. In vitro, PCN enhanced wound closure and fibroblast migration and suppressed TGF β 1 induced collagen I, III and α SMA expression through a SMAD3 associated mechanism in a PXR dependent manner. These findings reveal a novel role for PXR as a potential key regulator of dermal fibroblast behavior and support its therapeutic potential in chronic wound environments.



Presenter: Alok Sinha

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr Prakash Kumar Jha, Assistant Professor, Plant and Soil Sciences

Title: Optimizing Biochar Use in Rice Production for Soil Health and Environmental Sustainability: A Global Meta-Analysis

Abstract: Rice cultivation is vital for food security but is a major source of methane (CH₄) and nitrous oxide (N₂O). Biochar may help mitigate emissions, yet individual studies are context-specific and often contradictory. We conducted a global meta-analysis of 54 studies (1,143 paired observations) comparing biochar-amended and control rice systems. Effects on CH₄, N₂O, global warming potential (GWP), greenhouse gas intensity (GHGI), total soil carbon stock response (TSCSR), and grain yield were estimated as log response ratios using random-effects models. On average, biochar reduced CH₄ by 18.1%, N₂O by 15.5%, GWP by 25.5%, and GHGI by 33.2%, while increasing yield by 11.1% and TSCSR by 70.0%. TSCSR reflects total soil carbon, including biochar-derived carbon, not native carbon sequestration alone. Mitigation was clearest in field trials; pot trials showed no consistent benefit. GHGI reductions were largest in coarse-textured soils, tropical regions, and with acidic biochar from high C:N feedstock pyrolyzed below 650 °C. Moderate rates (10-30 t/ha) gave the most consistent emission and yield benefits, although no statistically defined optimum emerged. High heterogeneity (I² > 90%) means results are context-dependent trends. Long-term field trials and economic assessments are needed to support adoption.



Presenter: Amir Hossein Ebrahim Pour

Presentation Type and Session: Flashtalk, F5

Level of Study: PhD

Department: Mechanical Engineering

Advisor: Yuan Ke

Title: Impact-wrench performance verification: challenges in measuring torque under realistic test conditions

Abstract: Impact wrenches deliver torque through rapid, high-energy impulses, which makes their output difficult to verify. Tightening occurs within a short, dynamic event, and the resulting torque can vary with tool condition and battery state. Prior research has advanced understanding of impact-tool dynamics and torque measurement. However, current verification practices often rely on indirect assumptions, manual checks, or static methods that do not capture the dynamic nature of impact tightening. As a result, torque results can be slow to obtain, hard to repeat, and difficult to trace.

This research, conducted in collaboration with an industry partner, investigates how measurement assumptions and test conditions influence the interpretation of impact-wrench torque. A verification framework is developed and evaluated using representative tightening conditions and defined performance criteria. The study examines the repeatability of dynamic torque results, the relationship between rotational behavior and delivered torque, and whether early tightening behavior can reliably predict final torque.

The contribution is a research-based foundation for faster, more repeatable, and traceable impact-wrench verification. Rather than proposing a standalone test fixture, this work identifies the criteria a reliable verification method must satisfy. These findings support tool development, quality assurance, and future testing standards.



Presenter: Amirhossein Eskorouchi

Presentation Type and Session: Flashtalk, F5

Level of Study: PhD

Department: Industrial and Systems Engineering

Advisor: Dr. Mohammad Maruffuzaman - Industrial and Systems Engineering

Co-Advisor: Dr. Haifeng Wang

Title: UOT-DETR: Distributionally Constrained Visual Quality Measurement with Unbalanced Optimal Transport for Wood-Chip Size Estimation

Abstract: Dense small-object detection in industrial inspection is commonly formulated as instance-level classification and localization, whereas many quality-monitoring tasks require accurate recovery of population distributions of physical attributes. This mismatch becomes critical in cluttered scenes, where missed small, overlapping, or partially occluded objects systematically shift the estimated distribution toward larger, more visible instances. To address this limitation, we propose the Unbalanced Optimal Transport Detection Transformer (UOT-DETR), a distributionally constrained Detection Transformer that introduces population-level size supervision into end-to-end object detection. UOT-DETR maps predicted and ground-truth boxes to empirical measures in a log-normalized size space and augments the Hungarian detection loss with a confidence-weighted unbalanced Sinkhorn divergence. By jointly penalizing transport in size space and unmatched mass, the proposed regularizer accounts for size distortion, missed detections, and spurious predictions. Because it is applied only during training, UOT-DETR retains standard DETR inference with no additional deployment cost.

Experiments use a natural dataset of 223 images containing 6,879 annotated wood-chip instances and a calibrated synthetic benchmark with known size distributions. On the natural dataset, UOT-DETR outperforms competing detectors in overall recall (mAR_{50-95}), small-object recall ($\text{mAR}_{50-95}^{\text{small}}$, $\text{small} = 42$), and size-distribution fidelity ($\text{KL} = 0.041\text{--}0.048$). Compared with standard DETR, it improves small-object mAR_{50} and mAP_{50} by 24.7 and 15.4 percentage points, respectively, with the largest gains under medium and high clutter. Controlled synthetic experiments further confirm improved recovery of known size distributions. These findings demonstrate that UOT-based population-level supervision improves detection completeness and distributional fidelity in dense industrial scenes.

One small correction: your original text had “overall recall ($\text{mAR}_{50} = 95$)”, which looks like a LaTeX formatting error. If you intended mAR_{50-95} , the version above is correct. If you actually intended a numerical value such as $\text{mAR}_{50} = 95\%$, then that sentence should be written differently.



Presenter: Amos Olakanmi Olowookere

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Comparative Biomedical Sciences, College of Veterinary Medicine

Advisor: Dr Hossam Abdelhamed, Assistant Professor, Comparative Biomedical Sciences.

Title: chp; a Pentose Phosphate Pathway gene determines *Listeria monocytogenes* fitness in-vitro and virulence in-vivo

Abstract: Metabolic pathways that allow *Listeria monocytogenes* (LM) to survive and replicate within host cells are central to its pathogenesis. The pentose phosphate pathway (PPP) supplies NADPH for oxidative stress defense and ribose-5-phosphate for biosynthesis and is preferentially engaged during cytosolic replication, yet the contributions of certain PPP enzymes to fitness, intracellular infection and in-vivo virulence remain poorly defined. We generated a Δ chp mutant (glucose-6-phosphate dehydrogenase, a NADPH producer) and characterized it under environmental stress, in macrophage infection models, and in murine systemic infection. Δ chp grew normally in unstressed brain heart infusion (BHI) broth but showed a prolonged lag phase under oxidative challenge (6 mM H_2O_2 ; $p = 0.0005$) and ~20% lower yield in minimal medium ($p = 0.041$). Bacterial entry and early intracellular replication remained intact, but replication subsequently arrested, indicating a post-entry requirement for NADPH-dependent metabolism. In-vivo, Δ chp was attenuated by $\log_{10}$ fold-changes of 1.48 in spleen and 1.78 in liver ($p = 0.0026$ and 0.0181). Collectively, deletion of chp yields an attenuated strain of LM, establishing chp as important for bacterial fitness and survival under environmental stress and within the host, sustaining intracellular replication and systemic dissemination.



Presenter: Andre C. Castro

Presentation Type and Session: Poster, P2

Level of Study: Master's

Department: Department of Biological and Agricultural Engineering

Advisor: Dr. Vitor S. Martins, Assistant Professor, Department of Biological and Agricultural Engineering

Title: Scaling very high resolution land cover mapping: a VLM-in-the-Loop, active learning approach

Abstract: Land cover products for the Conterminous United States (CONUS), such as the 30 m Annual National Land Cover Database (NLCD), lack the spatial detail needed for applications like fine-detailed environmental monitoring and urban planning. While reference annotations (manually delineating land cover classes) are essential to develop deep learning models with strong generalization capacity, manual annotation at very high resolution is prohibitively costly. To address this, we propose a scalable pipeline for 2.5 m land cover mapping that combines National Agriculture Imagery Program (NAIP) data and a super-resolved 2.5 m CONUS imagery product built from 2025 Sentinel-2 imagery. The proposed framework includes: (1) self-supervised pre-training with an unlabeled dataset, (2) stratified sampling to build class- and proportion-balanced training sets, (3) automatic annotation with the Nano Banana vision-language model (VLM), and (4) an active learning loop that adds data until a target accuracy is reached on a held-out test subset. As a proof of concept for national mapping, prototype experiments were conducted in the Memphis area (Shelby County, Tennessee), where 1,000 image patches (256×256 pixels, 2.5 m) were used to train a U-Net with a ResNet-34 encoder, which was evaluated on 200 held-out test patches across seven land cover classes. The model reached Dice scores of 0.71 (95% CI: 0.68–0.73) for Developed land (paved and built surfaces), 0.90 (95% CI: 0.89–0.91) for Forest and Woody Vegetation (tree canopy), and 0.71 (95% CI: 0.63–0.78) for Cultivated Crops (actively farmed fields). Even though these results come from a single county, they are promising and suggest that a model trained on masks obtained from VLM-based auto-annotation can already produce coherent land cover maps from super-resolved 2.5 m CONUS imagery.



Presenter: Anh Ta

Presentation Type and Session: Flashtalk, F2

Level of Study: PhD

Department: Chemistry

Advisor: Dr. Amanda L. Patrick, Associate Professor, Chemistry

Title: Predictive in Silico Screening for Potential (Eco)Toxicity of Ionic Liquids and their Decomposition Products: Preliminary Results and Paths Forward

Abstract: Ionic liquids (ILs) are salts liquid at or near room temperature with a wide liquid range. Given their tunability and various attractive properties, ILs are useful for a wide range of applications. ILs have long been touted as “green” and biologically benign, though the actual safety of these compounds is structure- and context-dependent. Further, ILs can decompose during use or disposal, producing compounds whose (eco)toxicological hazards may differ from the intact precursor IL.

Decomposition pathways were extracted from the literature for various ILs. Environmental fate properties, ecotoxicity, and human health endpoints were predicted in silico using three tools: OPERA, EPA TEST, and ProTox-3.0. Outputs were converted into descriptive concern scores and visualized with a heatmap to compare hazard patterns across compounds and endpoints. Preliminary results indicate that environmental fate endpoints have the highest concern, mutagenicity is a notable human health endpoint, and different structural features of the IL can contribute to the formation of decomposition products of concern. Future work will expand the dataset to additional ILs and decomposition methods, and explore the likely exposure and environmental persistence profiles of decomposition products. Overall, this work aims to support safer IL design and environmental risk assessment.



Presenter: Anthony Obinna Umeojiakor

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Forestry

Advisor: Dr. Courtney Siegert, Professor, Forestry.

Co-Advisor: Dr. Joshua Granger, Associate Professor, Forestry

Title: Examining the Response of Upland Oak Regeneration, Recruitment and Overstory Growth to Midstory Herbicide Injection in Hardwood Forests of Northern Mississippi.

Abstract:

Upland Hardwood Forests are highly valued for provision of ecosystem services and economic importance. However, these forests are currently experiencing intense competition from shade-tolerant species, low light penetration, mesophication driven by fire suppression, etc. which has led to decline in oak regeneration. Therefore, this study aimed to examine the response of upland oak regeneration, recruitment and overstory growth to midstory herbicide injection in Hardwood Forests. This study was conducted at Spirit Hill Farm in Tate and Marshal Counties, MS on 234 hectares of mixed hardwood forest. Three treatments (T1, T2, T3) were arranged in a randomized complete block design with 4 blocks and 5 replicate plots per treatment. Tree height and DBH were recorded for overstory and midstory plots. For regeneration plots, we measured oak seedling height, root collar diameter (RCD), oak seedling density and survival. Data was analyzed using R statistics. Preliminary results revealed significant differences in RCD among treatments with T1, T2 and T3 had an estimated mean of 2.77 ± 0.23 , 2.31 ± 0.15 and 1.93 ± 0.08 mm. Tree height differed significantly among treatments with T1, T2 and T3 recorded an estimated mean tree height of 24.6 ± 0.381 , 26.0 ± 0.396 and 25.8 ± 0.437 .



Presenter: Anusha Shrestha

Presentation Type and Session: Poster, P3

Level of Study: Master's

Department: Department of Forestry

Advisor: Dr. Ram Adhikari, Assistant Professor, Department of Forestry

Title: Effects of Coastal Flooding and Storm Surge on Wood Product Demand in the United States

Abstract: Communities along the US coast face increasing risks from coastal flooding and storm surge, threatening infrastructure and natural resource bases. The domestic wood product market is particularly sensitive to these disturbances because of its role in supplying construction materials for residential housing. This study examines how coastal flooding and storm surge affect demand for sawnwood and wood-based panels in the United States. Using publicly available national-level data from 1970 to 2024 on wood product demand, sea level rise, and other demand shifters, the study applies an Instrumental Variables (IV) model to estimate their effects on wood product demand. Sea level rise in US coastal areas is used as a proxy for coastal flooding and storm surge. During the study period, sea level rose approximately 16 centimeters and is expected to continue rising with climate change. Preliminary results indicate that sawnwood and wood-based panel demand increased with sea level rise and economic growth. The finding implies that greater exposure to coastal flooding and storm surge may increase wood product consumption, potentially driven by inland migration and new residential development. The study suggests establishing a policy that helps domestic wood product production to meet the growing demand caused by various climate threats.



Presenter: Arun Kuttoor Vasudevan

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Sustainable Bioproducts

Advisor: Dr. Mostafa Mohammadabadi

Title: Topology-Inspired Optimization of Engineered Wood Beams with Curved Corrugated Cores.

Abstract: Innovations in engineering have increased interest in using complex geometries to improve structural performance. Curved shapes being a classic example, as they can distribute loads efficiently while making structure lighter in weight. However, maintaining high structural performance is equally important. Corrugated geometry provides such an opportunity, as it has been used to develop structures with high specific stiffness and strength. This concept has also been explored in engineered wood products. However, the question remains is how to optimize the core to develop high-performance engineered wood beams via topology inspired design? This study presents a new curved corrugated panel and explores the design efficiency and structural performance of engineered wood beams incorporating such panels in the core. Beam performance was analyzed numerically by considering concave and convex core configurations. Based on the results, the optimal geometry was selected, and panels were manufactured from commercial southern yellow pine strands using an aluminum matching-die mold. Beam cores were assembled from these panels and bonded between solid lumber layers. Compression and four-point bending tests were performed to validate the finite-element predictions and compare performance with conventional glulam. Additional core configurations were explored, demonstrating structural performance comparable to glulam used in mass timber construction.



Presenter: Ashan Madumal

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Agricultural & Biological Engineering

Advisor: Dr. Hussein Gharakhani, Assistant Professor, Agricultural and Biological Engineering

Title: Robotic Fruit Harvesting with Vision Guidance, In-Hand Manipulation, and Continuous Transfer

Abstract: Robotic fruit harvesting requires precise perception and gentle manipulation to maintain fruit quality while improving efficiency. This study presents an integrated harvesting system combining machine vision with a 5-DOF multi-functional end-effector mounted on a 3-DOF prismatic arm. A YOLOv8 nano model, trained on laboratory images augmented with a public apple dataset, achieved a precision of 0.97 and a recall of 0.93. An Intel RealSense D455f RGB-D camera achieved a mean localization error of 8.9 mm in controlled laboratory tests. The end-effector has two, belt-driven fingers and a wrist joint, enabling various movements, including bending, twisting, and pulling. Before gripping, our in-hand manipulation corrects fruit orientation about the X and Z axes with accuracy above 80% and 98%, respectively. After picking, the counter-rotating belts transfer the fruit to the rear of the end-effector, where it is released into a collection area, so the robot moves directly to the next nearest target without returning home. In a 5-fruit harvesting sequence with continuous picking mode, total cycle time was reduced by 34% compared with a conventional strategy requiring homing between picks. Ongoing work focuses on vision-based orientation estimation, force sensing, and field evaluation to support scalable, rapid, and gentle fruit harvesting.



Presenter: Asifur Rahman

Presentation Type and Session: Flashtalk, F5

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dr. Nuwan K. Wijewardane, Assistant Professor, Agricultural and Biological Engineering

Co-Advisor: Dr. Xin Zhang, School of Environmental, Civil, Agricultural and Mechanical Engineering, University of Georgia, Athens, GA

Title: RTK-GNSS-Based Waypoint Navigation of a Husky A300 UGV for Precision Soil Sampling

Abstract: High-resolution soil health mapping requires dense spatial sampling across agricultural fields, but manual soil sampling is time-consuming, labor-intensive, and inconsistent across operators. These limitations make it difficult to collect repeatable soil data from predefined sampling locations. This study developed a Husky A300-based autonomous navigation baseline to support repeatable travel to target sampling points as a first step toward automated soil sampling. The system was implemented in ROS 2 and integrated RTK GNSS, wheel odometry, and onboard orientation sensing for real-time field navigation. Heading information was obtained from onboard orientation sensing during alignment and motion-based GPS heading during travel. A waypoint navigation framework was developed with waypoint stopping, heading alignment, CSV logging, and field-performance tracking. To improve operation in loose agricultural soil, an adaptive recovery mode using progressive forward-reverse rocking turns was added to assist large heading changes. Four navigation strategies, XTE + PD, modified Stanley, modified Pure Pursuit, and point-to-point heading control, were evaluated across three field layouts with three repetitions per layout using a 20 lb payload. Results showed that the Stanley controller provided the best overall balance between path-tracking accuracy and field stability.

Presenter: Autumn Pecarovich

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Forestry

Advisor: Dr. Heidi Renninger

Title: Beyond the Adaptive Cycle: Drought, Frost, and Defoliation Impact Seedling Physiology Under Novel Disturbance Regimes

Abstract: Climate change is expected to alter the frequency, intensity, and severity of drought and frost events while simultaneously increasing defoliation from climate-driven insect outbreaks and expanded pest ranges. These disturbances rarely occur in isolation, and climate change is increasing the likelihood that these events occur in close succession or as compounding events. This increased potential for interacting stress is particularly relevant for seedlings, which are more vulnerable to environmental stressors relative to mature trees, due to their limited carbon reserves and developing root systems, which constrain their ability to buffer against repeated stressors. While individual disturbance effects have been widely studied, their interactive physiological effects on tree seedlings have rarely been tested experimentally. This greenhouse study evaluates how simulated single disturbances and disturbance combinations affect the physiology, growth, and survival of shortleaf pine (*Pinus echinata*), loblolly pine (*Pinus taeda*), and sweetgum (*Liquidambar styraciflua*) seedlings. Single disturbance treatments include drought, frost, and defoliation, while disturbance combination treatments involve all combinations of any two disturbance types. Preliminary results will be presented and will discuss how species-specific responses reveal trade-offs between growth and carbon storage and how results may inform climate-adaptive silviculture in Southeastern forests.





Presenter: Ayushma Sharma

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Wildlife, Fisheries and Aquaculture

Advisor: Taylor Heckman

Title: Evaluating the Safety of Dietary and Injectable Antibiotic Therapies in Catfish Broodstock

Abstract: *Streptococcus dysgalactiae* is an emerging pathogen impacting channel catfish (*Ictalurus punctatus*) broodstock and hatchery operations. Antibiotic therapy may help control broodfish infections, but potential effects on reproduction must be considered. This study investigated the impact of two antibiotic regimens on hatch metrics. For medicated-feed evaluation, broodfish were divided into ponds at 40♀:40♂. Pond A received premixed florfenicol (FFC) pellets at 15 mg/kg for 10 days while B and C received the control diet. After 10 days, Pond A resumed the control diet and Pond B initiated treatment. Following Pond B's treatment, breeding pairs were moved into spawning tanks. Successful spawns were collected to assess egg viability, hatchability and fry swim-up metrics. For injectable antibiotic evaluation, two additional compounds were selected based on safety evidence from other species: ceftiofur (CTF) and tulathromycin (TULA). Antibiotics (20 mg/kg FFC; 6.6 mg/kg CTF, 5 mg/kg TULA) or controls were administered alongside a primary hormone dose to ≥9 broodfish per treatment and eggs collected by artificial spawning to assess treatment effects. Initial results indicated that injectable florfenicol at the tested dose reduced hatch rates and caused observable developmental defects. Further studies are necessary to optimize these antibiotics for safe use against streptococcosis in broodfish.



Presenter: Bhawana DC

Presentation Type and Session: Poster, P2

Level of Study: Master's

Department: Department of Plant and Soil Sciences

Advisor: Dr. Raju Bheemanahalli, Associate Research Professor, Plant and Soil Sciences

Title: Balancing Act: Impact of Heat and Drought on Soybean Yield and Nutrition

Abstract: Soybeans (*Glycine max* L.) often experience drought (DS) and heat stress (HS) during seed development, causing yield and mineral losses. Previous studies have focused on growth, physiological, and reproductive mechanisms affecting yield. However, little is known about how these stressors affect grain nutrition. Two-year experiments assessed the effects of individual and combined HS+DS on grain yield and mineral composition across 10 high-yielding genotypes grown in the southern US. Genotypes were grown under four environments from full bloom to maturity: control (CNT), HS, DS, and HS+DS. These conditions led to the largest yield losses (seed weight by 51% and seed number by 54%) compared with CNT. Nitrogen and phosphorus decreased under all stress treatments, with the greatest decreases under HS or HS+DS. Potassium increased under combined stress, while sulfur, boron, and zinc increased across all stress treatments. Calcium increased most under combined stress. Higher seed mineral concentrations under stress may reflect smaller seed size rather than better performance. Principal component analysis revealed a stress-induced shift in the yield-nutrition relationship and identified genotypes with high nutrition under individual and combined stress. Results highlight the importance of selecting for both yield and seed nutrition under hot, dry conditions.



Presenter: Bipin Bastakoti

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr. Prakash K. Jha, Asst. Professor, Plant and Soil Sciences

Title: Can Fine-Tuned Segment Anything Models Enhance Crop Mapping Using EnMAP Hyperspectral Imagery?

Abstract: Accurate agricultural land-use mapping is essential for crop monitoring, agricultural management, food security assessment, and carbon accounting. Conventional pixel-based classification approaches often produce fragmented outputs and may fail to adequately preserve the spatial structure of agricultural fields. This study presents an integrated hyperspectral and foundation-model framework for object-based agricultural land-use mapping in the Mississippi Delta. EnMAP hyperspectral imagery was processed using principal component analysis (PCA) to generate input imagery and enhance spectral discrimination among crop types. A Segment Anything Model (SAM) was fine-tuned using crop-specific training data to automatically delineate agricultural field objects and generate crop segmentation masks. The resulting SAM-derived field objects were integrated with hyperspectral features to characterize and classify major agricultural land-use types, including soybean, cotton, corn, and rice. The fine-tuned SAM demonstrated effective delineation of agricultural crop areas, achieving segmentation accuracies of 0.738 for soybean, 0.898 for cotton, 0.842 for corn, and 0.867 for rice. Recall values ranged from 0.727 to 0.830, while Dice scores ranged from 0.250 to 0.492 across the four crop types. Overall, the results demonstrate that combining EnMAP hyperspectral information with fine-tuned foundation-model segmentation can improve object-level characterization of agricultural landscapes. The proposed framework provides a scalable approach for agricultural land-use monitoring and has potential applications in precision agriculture, crop inventory, environmental assessment, and carbon accounting across heterogeneous agricultural landscapes.



Presenter: Bishal Adhikari

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Department of Agricultural and Biological Engineering

Advisor: Dr. Dong Chen, Assistant Professor, Agricultural and Biological Engineering

Title: Future Farming XR: An Extended Reality Command Center for Autonomous Fleet Management and Farm Supervision

Abstract: Autonomous robots and drones can improve agricultural productivity, but their adoption is often limited by farmers' difficulty in monitoring, understanding, and intervening in autonomous operations. Future Farming XR addresses this challenge through an extended reality platform that combines fleet monitoring, real-time visualization, telepresence, remote intervention, and operator training within a unified interface. The system integrates a Farm-ng Amiga ground robot, Meta Quest 3 headset, MQTT-based telemetry and control, WebRTC video streaming, Tailscale networking, and field connectivity through Starlink. Operators can monitor multiple vehicles using a virtual farm diorama, receive alerts when autonomous systems encounter uncertain situations, and remotely take control of a robot when intervention is required. Field testing demonstrated the complete workflow from robot monitoring and alert detection to telepresence-based takeover and return to autonomous operation. Initial evaluation also indicated positive farmer responses toward real-time monitoring and remote takeover capabilities. The proposed system demonstrates how XR can provide a practical human-supervision layer for autonomous agricultural machinery.



Presenter: Chami Rampati Dewage

Presentation Type and Session: Poster, P2

Level of Study: Master's

Department: Department of Plant and Soil Sciences

Advisor: Dr.Raju Bheemanahalli Rangappa, Associate Professor, Plant and Soil Sciences

Title: Salinity Tolerance of Soybean across Growth Stages

Abstract: Soil salinity is a significant abiotic stressor that limits soybean productivity by affecting growth and development across growth stages. Over two years, several experiments were conducted to assess seedling tolerance to sodium chloride (NaCl , 6 dS m^{-1}) in a diverse soybean genotype. However, it remains unclear whether salinity tolerance observed during early growth persists into later developmental stages. Thus, in addition to the seedling stage, we quantified the multi-stage salt tolerance of soybean genotypes across vegetative and reproductive stages. Four soybean genotypes, previously identified as either salt-tolerant or salt-sensitive, were subjected to salt stress (6 dS m^{-1}) during the vegetative stage (V2) for 14 days, and a subset of plants was allowed to recover to assess yield potential. In an independent experiment, the same genotypes were exposed to 6 dS m^{-1} at the reproductive stage (R1) to determine whether tolerance observed during the vegetative stage translated during the reproductive stage. In all experiments, a common set of parameters, including pigment, gas exchange, biomass accumulation, and root traits, was assessed. Results from the vegetative stage indicated significant genotypic variation in response to salinity. Among the evaluated genotypes, LS5009XS showed a relatively smaller reduction in the efficiency of photosystem II (30%), electron transport rate (32%), and shoot dry weight (3%) during the vegetative stages. Reproductive stage data are being collected to examine tolerance across multiple growth stages. Further rhizosphere soil was collected to examine difference microbiome composition between identified salt-sensitive and salt-tolerant genotypes.



Presenter: Chamika A. Silva

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dr. Nuwan Wijewardena, Assistant Professor, Agricultural and Biological Engineering

Title: Design and prototype a modular type seeding end-effector for autonomous precise seeding

Abstract: Robotic automation offers a pathway to improve the efficiency and repeatability of greenhouse experiments, particularly for precision seeding, gap filling, and standardized pot establishment. This study developed a modular seeding end-effector (EF) compatible with a commercially available robotic manipulator to securely place soybean seeds at predefined locations. The prototype was fabricated primarily with 3D printed components along with few off-the-shelf parts including, a ratchet and two linear rods and bearings. A servo-driven rotary disc closed the seed hole, while a limit switch was used provide positional feedback to the manipulator; servo actuation was controlled through an Arduino controller. Performance was evaluated with a soybean emergence trial between five soil trays seeded by the EF and another five, seeded manually (28 stations each; 140 per treatment). The EF placed at least one seed at 94.3% of stations, with 87.9% single-seed accuracy, 5.7% misses, and 6.4% doubles. At 14 days after planting, visible emergence and normal seedling establishment of the EF were close to manual-control values while mean dry weight was nearly identical (0.126 vs. 0.127) with similar variability. These results demonstrate the feasibility of a compact, swappable robotic seeding tool while identifying seed-delivery reliability as a priority for further refinement.



Presenter: Cheng Ouyang

Presentation Type and Session: Flashtalk, F4

Level of Study: PhD

Department: Agricultural & Biological Engineering

Advisor: Dr. Dong Chen

Title: Deep Reinforcement Learning-Enhanced Event-Triggered Data-Driven Predictive Control for a 3D Cable-Driven Soft Robotic Arm

Abstract: Abstract— Soft robots are challenging to control due to their nonlinear and time-varying dynamics. Data-enabled predictive control (DeePC) offers a model-free alternative by directly leveraging measured input–output trajectories to construct a predictive controller. However, its receding-horizon formulation requires solving a constrained optimization problem at every sampling instant, which can be computationally demanding for real-time deployment on resource-limited robotic platforms. To address this limitation, we propose an adaptive reinforcement learning-based event-triggered DeePC (RL-ET-DeePC) framework for soft robotic control. A model-free RL policy is trained to determine when to invoke the DeePC optimizer based on the current system state representation, thereby reducing unnecessary optimization calls while preserving closedloop performance. Simulation results show that RL-ET-DeePC reduces optimization frequency by up to 66% compared to periodic DeePC, while maintaining comparable tracking accuracy. Hardware experiments on a three-dimensional cable-driven soft robotic arm demonstrate zero-shot transfer, achieving a 34% reduction in optimization frequency with tracking accuracy comparable to periodic DeePC and more consistent performance than a static threshold-based event-triggered baseline.



Presenter: Chibuike Onyeogulu

Presentation Type and Session: Flashtalk, F2

Level of Study: PhD

Department: Chemistry

Advisor: Dr. Amanda Patrick, Chemistry

Title: Temperature-dependent Pyrolysis Products of Ionic Liquids

Abstract: Ionic liquids (ILs) are salts composed of bulky organic cations paired with various anions, distinguished by their wide liquid range and low melting points (typically below 100 °C). Their generally high thermal stability and negligible volatility make them attractive for various applications. However, certain applications may expose ILs to elevated temperatures over time and or brief extreme temperatures, testing their thermal stability. Likewise, waste disposal through incineration may generate (potentially hazardous) intermediate products if not accomplished completely. These are motivators for understanding the molecular nature of the high-temperature decomposition of ILs.

This study focuses on the detection and characterization of ILs pyrolysis products using gas chromatography–mass spectrometry. The impact of the anion’s nature, substituents on the imidazolium cation, and the pyrolysis temperature were investigated. Four ILs (1-(2-methoxyethyl)-3-methyl-imidazolium bis(trifluoromethylsulfonyl)imide, 1-(2-methoxyethyl)-3-methyl-imidazolium chloride, 1-butyl-3-vinylimidazolium bis(trifluoromethylsulfonyl)imide, and 1-butyl-3-vinylimidazolium chloride), were individually pyrolyzed from 200-1000 °C in 50 °C increment. Results showed that ILs containing bis(trifluoromethylsulfonyl)imide anion exhibited higher thermal stability (consistent with reports in the literature), showing little to no detectable decomposition until temperature exceeded 400 °C. Chloride paired ILs decomposed at lower temperatures starting from 250 °C. Ongoing efforts focus on identifying the resulting decomposition products and changes as a function of temperature.



Presenter: Dalila Belaidi

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Sustainable bioproducts

Advisor: Dr. Mostafa Mohammadabadi, Assistant professor, sustainable bioproducts.

Title: From Veneer Sorting to Structural Performance: Integrating Nondestructive Testing and Finite Element Modeling for Red Maple LVL

Abstract: Red maple is an abundant hardwood resource in the eastern United States but remains underutilized in high-value structural products. This study evaluated stress-wave nondestructive testing (NDT) and finite element modeling (FEM) to support veneer sorting, layup design, and bending-performance prediction of red maple laminated veneer lumber (LVL).

Veneers were evaluated using stress-wave NDT to determine dynamic modulus of elasticity (MOEd) and classified into low-, medium-, and high-MOEd groups. LVL billets were manufactured from each group and a mixed layup containing high-MOEd veneers in the outer layers and medium- and low-MOEd veneers in the core. The billets were tested in flatwise and edgewise bending to determine static modulus of elasticity (MOEs) and modulus of rupture (MOR). Layer-by-layer elastic finite element models assigned veneer properties using either direct MOEd values or calibrated static MOE values derived from NDT–tensile regression relationships.

NDT differentiated the veneer groups, and MOEd was strongly correlated with MOEs in both bending orientations. The mixed layup performed similarly to medium-MOEd LVL. Experimental MOEs fell between the predictions from the two FEM approaches. Integrating NDT, strategic layup design, and FEM can improve material utilization, reduce waste, and support the development of red maple structural products.



Presenter: Diego Alejandro Galindo

Presentation Type and Session: Flashtalk, F4

Level of Study: Master's

Department: Civil Engineering

Advisor: Dr. John J. Ramirez-Avila, Professor, Richard A. Rula School of Civil and Environmental Engineering

Title: The Role of Event Selection in Optimizing Curve Number Calibration

Abstract: The Soil Conservation Service Curve Number (SCS-CN) method is a fundamental tool for runoff estimation, originally designed to estimate runoff from large, spatially homogeneous rainstorms. However, its integration into continuous hydrological models introduces severe calibration bias due to the mathematical dominance of small, high-frequency storms. This study evaluates CN calibration discrepancies by contrasting continuous rainfall-runoff datasets against isolated maximum-event pools across 145 watersheds in the Southeastern United States. The impacts of seasonal stratification, a 25.4 mm precipitation depth screen, and initial abstraction ratios were investigated under empirical constraints and unconstrained optimization, using traditional Kling-Gupta Efficiency (KGE) and a composite metric, OF-KGE. Results demonstrate that calibrating with unfiltered continuous records systematically inflates baseline Curve Numbers. Unconstrained optimization masks this flaw by abandoning physical parameter limits, driving values toward zero to capture trace runoff or exceeding 1.0 to artificially choke runoff generation. Applying seasonal stratification alongside a 25.4 mm screen filters mathematical noise, significantly narrowing volumetric bias while forcing continuous datasets to structurally mimic baselines. However, seasonal analysis reveals a universal predictive collapse during summer months, as localized convective storms violate spatial homogeneity assumptions. Ultimately, utilizing OF-KGE explicitly penalizes volumetric bias, confirming that physically constrained isolated event pools remain optimal calibration standards.



Presenter: Doha Bounaim

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Michael W. Hall School of Mechanical Engineering

Advisor: Dr. Gang Li, Assistant Professor, Michael W. Hall School of Mechanical Engineering

Title: Reliable wind power forecasting for predictable hydrogen costs JOVET framework for wind-to-hydrogen systems

Abstract: This work proposes a jointly optimized multi-variational mode embedded Transformer (JOVET) framework that improves levelized cost of hydrogen (LCOH) forecasting reliability for wind-to-hydrogen systems under uncertainty. In contrast to disjointed hybrid pipelines, JOVET is a unified embedded framework incorporating joint particle swarm optimization, jointly tuning multi-variational mode decomposition and Transformer hyperparameters. Embedding multi-variational modes into a multi-head-attention Transformer filters stochastic noise from supervisory control and data acquisition data, producing more stable LCOH forecasts. Benchmarked against time-series and decomposition-based models, JOVET achieves a mean absolute error of 77.34 kW, root mean square error of 124.38 kW, mean absolute percentage error of 7.36%, and coefficient of determination of 0.9914 for wind power forecasting, outperforming the best non-embedded baselines. Propagated to annual levelized cost metrics for alkaline and proton exchange membrane electrolyzers, JOVET yields an annual relative error of 0.007%, the smallest deviation among baselines, which propagates into the tightest LCOH distribution.



Presenter: Edirisa Juniour Nsubuga

Presentation Type and Session: Flashtalk, F1

Level of Study: PhD

Department: Biochemistry, Nutrition and Health Promotion

Advisor: Dr. Rahel Mathews. Associate Professor, Biochemistry, Nutrition and Health Promotion

Co-Advisor: Dr. Meng Yang, Assistant Professor, Biochemistry, Nutrition and Health Promotion

Title: Sequential Mediation Effects of First Feeding Practices and Early Breastfeeding Initiation on the Relationship Between Prenatal Exclusive Breastfeeding (EBF) Intentions and EBF at 5 Months: A Prospective WIC ITFPS 2 Study

Abstract: Background: Prenatal exclusive breastfeeding (EBF) intentions are consistently associated with EBF, the recommended feeding practice for infants under 6 months, yet suboptimal EBF rates remain.

Objective: This study examined the sequential mediation effects of first feeding practices and early breastfeeding initiation on the relationship between prenatal EBF intentions and EBF.

Methods: A prospective WIC ITFPS-2 cohort of 4,367 infant-caregiver dyads was analysed using sequential mediation analysis. Adjusted path coefficients (β) of first feeding practices and early breastfeeding initiation on the relationship between prenatal EBF intentions and EBF were reported based on an analytical sample of 2,617 observations with complete EBF data. Robustness was assessed through sensitivity and subgroup analyses.

Results: Among 2,617 mothers, 61.2% White, and 22.8% African-American. The sequential indirect effect of prenatal EBF intention on EBF via first feeding practices and early breastfeeding initiation was significant ($\beta = -0.062$, $p = 0.009$). Indirect effects were observed through first feeding practices ($\beta = 0.252$, $p < 0.001$) and early breastfeeding initiation ($\beta = 0.036$, $p = 0.017$), with a significant total indirect effect ($\beta = 0.226$, $p < 0.001$). The direct ($\beta = 0.292$, $p < 0.001$) and total effects ($\beta = 0.518$, $p < 0.001$) were significant, indicating partial mediation.

Conclusions: Incorporating strategies that promote prenatal EBF intention, early breastfeeding initiation, and discourage pre-lacteal feeding into child nutrition programs could improve EBF.



Presenter: Edirisa Juniour Nsubuga

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Biochemistry, Nutrition and Health Promotion

Advisor: Dr. Rahel Mathews, Associate Professor, Biochemistry, Nutrition and Health Promotion

Co-Advisor: Dr. Meng Yang, Assistant Professor, Biochemistry, Nutrition and Health Promotion

Title: Sequential Mediation Effects of First Feeding Practices and Early Breastfeeding Initiation on the Relationship Between Prenatal Exclusive Breastfeeding (EBF) Intentions and EBF at 5 Months: A Prospective WIC ITFPS 2 Study

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Conclusions: Incorporating strategies that promote prenatal EBF intention, early breastfeeding initiation, and discourage pre-lacteal feeding into child nutrition programs could improve EBF.



Presenter: Edward Akuffo Addo Dankwa

Presentation Type and Session: Flashtalk, F2

Level of Study: PhD

Department: Mathematics and Statistics

Advisor: Dr. Jonathan Woody, Professor, Mathematics and Statistics

Title: A Count Time Series Model With Changepoint Considerations

Abstract: Accurate assessment and trend analysis in count time series is very important due to its application in manufacturing, finance, climate etc. , yet the historical record from these field is complicated by overdispersion, serial dependence, and inhomogeneities arising from changes in observation technology, features that previous analyses have failed to address simultaneously. We model a beta-binomial count time series, coupling a latent Gaussian autoregressive process with a time-varying marginal distribution whose mean accommodates trends and multiple unknown changepoints.



Presenter: Elizabeth Esser

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Forestry

Advisor: Dr. Ashley Schulz, Assistant Professor, Forestry

Title: Potential of Harnessing Autotoxic Extracts to Control Invasive Cogongrass Growth

Abstract: Cogongrass (*Imperata cylindrica*) is an invasive plant that threatens the health of many important forested ecosystems in the United States. It forms dense monocultures that threaten the native biodiversity and economic productivity of forests by increasing fire intensity, altering fire regimes, and preventing forest regeneration. Current cogongrass control methods, including repeated applications of glyphosate and imazapyr, are ineffective and can unintentionally harm native plants, necessitating the development of alternative methods. This research seeks to determine the potential to harness autotoxicity, or toxicity from compounds produced by cogongrass itself, for cogongrass management. To test the potential for autotoxicity, extracts were applied to seeds of other plant species for which allelopathy has already been established to determine if the extracts are bioactive, and extracts were applied to cogongrass rhizomes to test for autotoxicity. This study is ongoing, but preliminary data shows evidence that cogongrass extracts reduce germination in multiple seed species. This research will aid in the development of more sustainable and effective methods of cogongrass management. Harnessing autotoxic compounds could allow for more complete control of cogongrass populations while limiting off-target effects to native species and species of commercial importance, improving our ability to manage this invasive plant.



Presenter: Eryn Fleming

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Department of Pathobiology and Population Medicine

Advisor: Dr. Isaac Jumper, Department of Pathobiology and Population Medicine

Co-Advisor: Dr. Larry Hanson, Department of Comparative Biomedical Sciences

Title: Investigation of Environmental Factors Associated with Total Microcystin Concentrations in Farm-Raised Hybrid Catfish (♀ Channel × ♂ Blue) Ponds.

Abstract: Microcystins are hepatotoxins produced by freshwater cyanobacteria that negatively affect farm-raised catfish health and production. This study aimed to identify associations between environmental factors and microcystin concentrations in 22 hybrid (channel x blue) catfish grow-out ponds and evaluate cyanobacterial abundance and temporal dynamics over eight weeks. We evaluated 17 environmental variables, measured the abundances of 18 cyanobacterial taxa, and quantified total microcystin using the ABRAXIS Microcystin/Nodularin (ADDA) immunoassay. Associations were evaluated using linear mixed-effects models with pond as a random effect. *Oscillatoria* sp. was the most abundant taxon, while other taxa varied over time. Univariable analysis identified positive associations between log-transformed microcystin and ammonia ($p=0.0140$), water temperature ($p=0.0030$), pH ($p=0.0097$), and dissolved oxygen ($p=0.0003$). The final multivariable model included dissolved oxygen ($p=0.0005$) and ammonia ($p=0.0177$). Increased dissolved oxygen may reflect active cyanobacterial blooms and resultantly increase total yields of intracellular microcystin. Ammonia from fish excretion and feed inputs may provide nitrogen supporting cyanobacterial proliferation. Unlike nitrate and nitrite, ammonia was associated with increased microcystin, suggesting that even low concentrations may provide bioavailable nitrogen that can influence cyanobacterial toxin production and fish health more than previously recognized.



Presenter: Etseoghena Oladejo

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: School of Human Sciences/Human Development and Family Science

Advisor: Dr. Lori Elmore-Staton

Title: Family coping and child behavioral adjustment in families with parental alcohol problems

Abstract: Parental alcohol problems are chronic stressors linked to children's problem behaviors (Haugland et al., 2021). Drawing on the Vulnerability-Stress-Adaptation model (Karney & Bradbury, 1995), this study examined whether family coping moderates the association between parental alcohol problems and child behavioral adjustment. The study examined whether parental alcohol problems were associated with teacher-reported child internalizing and externalizing problems and whether family coping moderated these associations.

This cross-sectional study used secondary data from 172 two-parent families and children ages 6 – 12. After listwise deletion, the sample included 90 families. Parental alcohol problems were assessed using the Michigan Alcoholism Screening Test, family coping using F-COPES, and child behaviors using the Teacher Report Form. Hierarchical moderated regression analyses controlled for child age, sex, and family income.

Paternal, but not maternal, alcohol problems were significantly associated with externalizing behavior ($\beta = .322$, $p = .003$), and this association was moderated by family coping ($\Delta R^2 = .041$, $p = .041$). Under low paternal alcohol problems, higher family coping was associated with fewer externalizing problems. However, family coping did not buffer children when paternal alcohol use was problematic. Future research should examine when family coping strategies translate into protective outcomes for children affected by parental alcohol problems.



Presenter: Evan G Moore

Presentation Type and Session: Poster, P3

Level of Study: Master's

Department: Forestry

Advisor: Dr. Ram Adhikari, Professor, Department of Forestry

Title: Spatial Optimization of Prescribed Fire to minimize Wildfire Incidence in Mississippi

Abstract: Prescribed fire plays a major role in the mitigation of wildfire risk across the US, including Mississippi. However, prescribed fire has been declining as a tool over the past decade, which could have dangerous consequences on the potential for greater wildfire incidence and its associated suppression costs as the frequency of extreme climatic events increases. There is no empirical study analyzing the impact of spatial distribution of prescribed fires on wildfire incidence. This study analyzes the impact of prescribed fire spatial distribution on wildfire incidence in Mississippi and identifies strategies to minimize wildfire suppression costs. To do this, data on the occurrence of wildfire and prescribed fire was analyzed for each county over every year from 2016 through 2024 in a panel regression along with other control factors such as weather, vegetation type, topography and road network. Initial results indicate that prescribed fires conducted in the wildland–urban interface, particularly when implemented at greater frequencies, help reduce wildfire incidence in Mississippi. We hope this finding can inform decision makers such as the Mississippi Forestry Commission about how they can optimize prescribed fires to best reduce wildfire risk while minimizing the suppression costs.



Presenter: Gbenga I. Elufisan

Presentation Type and Session: Flashtalk, F3

Level of Study: PhD

Department: Department of Sociology

Advisor: Dr. Diego Thompson, Department of Sociology

Title: Farming While Retired: Black Farmers' Effort to Keep Legacy Alive

Abstract: The US farming population is not only declining but also aging, and only about two percent of the U.S. farmers is Black. Although the interest in farming has declined significantly among the youth, contributing to the near disappearance of farming in rural Black communities, existing farmers continue farming beyond retirement age, and Black and women pivot into late-life farming. However, motivation into late-life farming among Black people remains under-researched. Using qualitative approach, this study examines the motivations for farming among Black farmers in Mississippi. Findings show that the 'romanticized idea of farming' encourages older Black individuals to engage in late-life farming after retirement from out-of-farm jobs, reflecting the role of retirement into farming in sustaining agriculture. This study provides explanations about farmers' demographic shifts and efforts to keep the culture of farming alive in Black communities of Mississippi.



Presenter: Hemraj Kathayat

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Department of Comparative Biomedical Sciences

Advisor: Dr. Attila Karsi, Professor, Department of Comparative Biomedical Sciences

Co-Advisor: Dr. Hasan C. Tekedar, Assistant Research Professor, Department of Comparative Biomedical Sciences

Title: The Conserved Tripartite RND Efflux Pump AcrBAR-TolC Governs Growth Fitness, Biofilm Formation, and Antibiotic Resistance in *Edwardsiella ictaluri*

Abstract: Enteric Septicemia of Catfish (ESC), caused by *Edwardsiella ictaluri*, continues to cause significant economic losses on the U.S. aquaculture industry. Although antibiotics remain the primary treatment, efflux pump systems are known to contribute to antimicrobial resistance and virulence in many Gram-negative bacteria, however their roles in *E. ictaluri* have remained largely unexplored.

We conducted a pan-genome analysis of fish pathogens that revealed several conserved efflux pump genes in *E. ictaluri*. Among them, we targeted RND-superfamily and constructed in-frame deletion mutants, generating the mutant strain *EiΔacrBAR*, *EiΔtolC*, and *EiΔacrBARΔtolC*. Here, we characterize the functional contribution of these genes individually and in combination to growth fitness, biofilm formation, efflux activity, and antibiotic resistance.

Growth kinetics of WT and mutants were similar during up to exponential phases, but *EiΔtolC* showed significantly reduced growth after 10 hrs. Also, the growth of all strains was pH-dependent, peaking at pH 6–8 with no differences at extreme pH, while within this range efflux loss impaired growth in a pump- and pH-specific manner, most notably for *EiΔacrBAR* at pH 6–7, *EiΔacrBARΔtolC* at pH 7, and across all mutants at pH 8. Biofilm formation differed significantly between WT and mutant strains. Ethidium Bromide efflux assays showed that glucose-driven



Presenter: Honor Elchos

Presentation Type and Session: Poster, P5

Level of Study: Master's

Department: Agricultural and Biological Engineering

Advisor: Dr. Lauren Priddy, Associate Professor, Agricultural and Biological Engineering

Co-Advisor: Dr. Matthew Priddy, Associate Professor, Michael W. Hall School of Mechanical Engineering

Title: Development and characterization of 3D printed nHA/PLGA composite materials for bone scaffold engineering

Abstract: Critically sized bone defects remain a significant clinical challenge due to limitations associated with autologous bone grafting. Extrusion-based 3D printed scaffolds offer a promising alternative by enabling control over scaffold geometry, composition, and mechanical properties. This study investigated the effects of incorporating nano-hydroxyapatite (nHA) into poly(lactic-co-glycolic) acid (PLGA) on material properties relevant to scaffold fabrication. PLGA/nHA composites containing 0, 10, and 20 wt% nHA were fabricated and characterized using thermogravimetric analysis, differential scanning calorimetry, rheology, compression testing, and microcomputed tomography. All formulations remained thermally stable within the 115–125°C printing range, although nHA incorporation altered degradation temperature and thermal transitions. Rheological characterization demonstrated composition-dependent flow behavior, with 20% nHA exhibiting the highest viscosity. Compression testing demonstrated a non-linear relationship between nHA concentration and modulus, with 0% nHA exhibiting the highest modulus, followed by 20% and 10% nHA. However, the average moduli of the 0% and 20% formulations remained within the range reported for native trabecular bone. Overall, nHA concentration significantly influenced PLGA processing and mechanical behavior, emphasizing the importance of material characterization and print parameter optimization when developing PLGA/nHA scaffolds for bone tissue engineering.



Presenter: Iffat Ara Ebu

Presentation Type and Session: Flashtalk, F5

Level of Study: PhD

Department: Electrical and Computer Engineering

Advisor: Dr. John E. Ball, Professor, Electrical and Computer Engineering

Title: Identity-consistent multi-object tracking via Interacting Multiple Model Kalman filtering for fish species monitoring

Abstract: Accurate underwater multi-object fish tracking is essential for fisheries management, population assessment, and long-term ecosystem monitoring. However, reliable tracking in unconstrained underwater environments remains challenging due to low visibility, complex backgrounds, frequent occlusions, turbidity, and the highly irregular swimming behavior of fish. Existing tracking methods typically rely on a single constant-motion Kalman filter (KF), which is often insufficient to model abrupt accelerations and non-linear fish movements, leading to identity switches (IDSW) and fragmented trajectories. To address these challenges, we propose IMM-Byte, an enhanced ByteTrack framework that integrates an Interacting Multiple Model (IMM) estimator with Constant Velocity (CV) and Constant Acceleration (CA) KFs for adaptive motion prediction. Additionally, we adapt the FishIoU metric to enhance data association and identity preservation under severe occlusions, non-linear fish maneuvers, turbidity, and visual camouflage. The proposed framework is evaluated on the Gulf Fishery-Independent Survey of Habitat and Ecosystem Resources Dataset 2024 (GFISHERD24) and the public DanceTrack benchmark. Experimental results demonstrate that IMM-Byte consistently outperforms state-of-the-art (SOTA) trackers. Compared with the standard ByteTrack, the proposed method reduces identity switches from 485 to 253 (47.84%) while improving IDF1 and MOTA, resulting in more stable trajectories and more reliable long-term tracking for automated fish abundance estimation.



Presenter: Iffat Ara Ebu

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Electrical and Computer Engineering

Advisor: Dr. John E. Ball, Professor, Electrical and Computer Engineering

Title: Robust Underwater Fish Tracking via IMM-Based Motion Prediction and Domain-Specific Bounding Box Association

Abstract: Computer vision has become an important tool for automated fish detection and tracking, supporting continuous ecological monitoring and fisheries management without the need for direct human observation underwater. However, underwater fish tracking remains challenging because multiple factors. In this study, underwater videos from the Gulf Fishery-Independent Survey of Habitat and Ecosystem Resources Dataset 2024 (GFISHERED24) were processed for fish detection and multi-object tracking using a YOLOX-based detector and a ByteTrack-based tracking framework. To improve tracking consistency, the standard Kalman filter (KF) used in ByteTrack was replaced with an interacting multiple model (IMM) estimator. Unlike the conventional constant velocity (CV) assumption, the proposed IMM framework incorporates multiple fish movement patterns, including constant velocity, acceleration, deceleration, and turning or maneuvering behavior. In addition, the traditional IoU-based association strategy was replaced with a FishIoU metric. Quantitative evaluation shows that the proposed IMM with FishIoU improves overall tracking performance. Incorporating IMM into ByteTrack increased HOTA from 44.32 to 45.34, AssA from 47.34 to 49.53, and IDF1 from 62.70 to 64.80, while reducing identity switches from 485 to 318. Further integration of FishIoU increased HOTA, AssA, and IDF1 to 45.77, 50.21, and 65.31, respectively. The complete framework reduced IDSW to 285, corresponding to a 41.24% reduction compared with baseline ByteTrack. These results suggest that adaptive motion modeling and fish-specific association can improve underwater multi-fish tracking, particularly in challenging scenarios involving low contrast, occlusion, and irregular fish motion.



Presenter: Istiak Ahmed

Presentation Type and Session: Poster, P4

Level of Study: Master's

Department: Sociology

Advisor: Independent study

Title: Gendered Vulnerability and Coping with Climate-Induced Landslides among Chakma Indigenous Women in the Chittagong Hill Tracts, Bangladesh

Abstract: Gendered Vulnerability and Coping with Climate-Induced Landslides among Chakma Indigenous Women in the Chittagong Hill Tracts, Bangladesh

Istiah Ahmed, Graduate Teaching Assistant, Department of Sociology, Mississippi State University, Mississippi, United States, Email: Email: ia283@msstate.edu

Dr. Joydeb Garai, Professor, Department of Sociology, University of Chittagong, Chattogram, Bangladesh, Email: joy.garai@cu.ac.bd

Landslides is one of the most significant climate-induced hazards in the hilly regions of Bangladesh, particularly in the Chittagong Hill Tracts area. Indigenous people, especially Chakma women, face heightened hazard vulnerability shaped by Socio-cultural norms, gender norms, and structural inequalities. This study examines the gender-specific vulnerabilities, lived experiences, and coping strategies of Chakma Indigenous women affected by landslides in Rangamati district, Bangladesh. The study used participant observation, in-depth interviews, and focus group discussions, using a purposive sampling technique to get the comprehensive overview of the landslide vulnerabilities and challenges encountered by the Indigenous Chakma women. The study explores that gender roles, caregiving responsibilities, household-based activities, limited access to resources, and culturally specific practices shape women's sufferings and experiences during climate-induced landslides. The findings also indicate that Chakma women face distinctive challenges during evacuation and recovery, including difficulties associated with traditional clothing and housing structures, loss of homes and productive land, and increased caregiving and household responsibilities.



Presenter: Jon Corser

Presentation Type and Session: Flashtalk, F1

Level of Study: PhD

Department: Agricultural Science and Plant Protection

Advisor: Dr. Luis Avila, Professor, Agricultural Science and Plant Protection

Co-Advisor: Dr. Paul Tseng, Professor. Agricultural Science and Plant Protection

Title: New Targets for Spray-Induced Gene Silencing for Weed Control

Abstract: Herbicide-resistant weeds are spreading faster than new herbicide modes of action are being developed, and RNA interference (RNAi) is an emerging tool for weed management. This research aimed to evaluate the use of small-interfering RNA (siRNA) molecules to target two paralogous genes encoding the same photosynthesis-related protein. We hypothesized that targeting both genes would reduce photosynthetic efficiency and result in the death of the plant. We organized the experiment in a randomized block design with four replications and conducted the experiment at the Mississippi State University Weed Physiology Laboratory. Treatments included targeting each gene individually, targeting both genes simultaneously, a control consisting of water and Silwet L-77[®] at a concentration of 0.01%, and a water-only control. Response variables were collected at 7, 14, and 21 days after treatment (DAT) with fresh and dry biomass being collected on 21 DAT. When we targeted both genes simultaneously, we observed wilting within 4 hours, followed by necrosis after 4 days and complete plant death by 7 DAT. These results show that applying siRNA treatments targeting both genes can rapidly disrupt plant function and cause death, highlighting their potential as targets for spray-induced gene silencing.



Presenter: Juliana de Abreu Araujo

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Vitor Sousa Martins - Professor - Department of Agricultural & Biological Engineering, Mississippi State University

Co-Advisor: Lucas Borges Ferreira - Professor - Mississippi Research and Extension Center, Mississippi State University

Title: Mapping the Americas: Operational 10-m Agricultural Extent Mapping Using AlphaEarth Embeddings

Abstract: Scalable high resolution cropland extent mapping is essential for food security and monitoring the dynamics of crop areas. In this study, we introduce a scalable framework for multi-continental cropland extent mapping in the Americas using AlphaEarth embeddings and Vision Transformers. We selected the Americas for this comprehensive experiment because of their food production importance, diverse climatic conditions, cropping practices, and complex agricultural calendars, allowing us to evaluate the generalization and capability of the proposed framework and deep learning models. First, we performed a semi-automatic labeling process, followed by visual inspection, to build a dataset of 26,970 cropland reference masks for 2020 to 2024 covering the Americas, including major crops such as soybean, corn, wheat, and rice. Using this reference dataset, we trained vision transformer models, including Swin Transformer, SegFormer, and Mask2Former, using three input representations: (i) AlphaEarth embeddings, (ii) EVI annual composites, and (iii) EVI quarterly composites to generate 10-m crop/non-crop area extent maps. Results indicate that embedding-based representations performed comparably to EVI-based models (Dice = 0.87 vs 0.86; IoU = 0.77 vs 0.76), while requiring no explicit computation of vegetation indices or temporal feature engineering. Additionally, we deployed the best-performing model through a high-performance computing workflow to generate annual cropland extent maps for 2017 to 2025, processing ~144 TB of AlphaEarth data. We observed a high-quality on field edge delineation, minimal salt-and-pepper effects, and consistent mapping across regions. These findings suggested that large-scale Earth Observation foundation models such as AlphaEarth effectively encode agronomic information relevant for cropland discrimination across regions and crop types. The final products will be made publicly available via an interactive dashboard and will serve as a foundational layer for subsequent applications, including agricultural monitoring, yield estimation, and sustainable land management.



Presenter: Kendall N. McKinnon

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: College of Veterinary Medicine (Department of Comparative Biomedical Sciences)

Advisor: Dr. Russell L. Carr, CVM Comparative Biomedical Sciences

Title: Differential In Vivo Sensitivity of Serine Hydrolases Following Chlorpyrifos-oxon Exposure in Juvenile Rats

Abstract: Developmental exposure to the organophosphorus insecticide chlorpyrifos (CPF) is linked to persistent neurobehavioral deficits. CPF primarily exerts neurotoxicity through its active metabolite chlorpyrifos-oxon (CPO), which irreversibly inhibits acetylcholinesterase (AChE). However, lower CPO dosages are shown to inhibit serine hydrolases, such as fatty acid amide hydrolase (FAAH) and carboxylesterase (CES), possibly leading to disruption of endocannabinoid signaling and lipid metabolism without triggering classic cholinergic symptoms. This study examines dose-dependent inhibition of FAAH, CES, and cholinesterase (ChE), following CPO exposure in juvenile rats. To investigate this, 21-day-old rat pups were subcutaneously administered with either vehicle or increasing CPO dosages and sacrificed 3-hours post-treatment. Enzyme activities were measured in the brain, liver, and serum. As CPO exposure increased, liver FAAH activity decreased, but no measurable change in liver CES was observed. Both serum CES and ChE showed dose-dependent inhibition with CES exhibiting greater sensitivity and maximal inhibition. In the brain, AChE and FAAH displayed similar plateau-like inhibition. Brain FAAH activity, however, was inhibited at lower CPO dosages in which AChE was minimally affected. These findings identify FAAH as a more sensitive target of CPO than brain AChE and suggest FAAH-mediated processes may be disrupted at sub-cholinergic exposure levels.

Presenter: Khadija Ferdous

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Clinical Sciences

Advisor: Dr. Cooper Brookshire, Associate Clinical Professor, Department of Clinical Sciences

Co-Advisor: Dr. Keun Seok Seo, Associate Professor, Department of Comparative Biomedical Sciences

Title: Antibiotic Effects on the Canine Gut Resistome and E. coli Dynamics: A Longitudinal One Health AMR Study

Abstract: Background: Broad-spectrum antibiotics can disrupt the gut microbiome and increase antimicrobial resistance genes (ARGs). However, the recovery pattern after antibiotic treatment in companion animals remains poorly understood. This matters because dogs may carry resistant bacteria that could be shared with humans.

Methods: Ten healthy beagle dogs received oral enrofloxacin and amoxicillin-clavulanate for seven days. Fecal and saliva samples were collected at ten time points before, during, and after treatment over 31 days. Microbial communities were evaluated using 16S rRNA and shotgun metagenomic sequencing. Individual E. coli isolates were cultured and whole-genome sequenced using Nanopore sequencing. ARGs and strain relatedness were analyzed, and a human handler sample was included to explore potential overlap.

Results: Several ARGs were present before treatment and persisted throughout the study. Other resistance genes, including blaCMY-2, aminoglycoside, and tetracycline resistance genes, appeared after treatment and remained detectable through day 31, suggesting incomplete recovery. A dominant E. coli strain persisted throughout the study, while a second strain was intermittently detected. The human isolate shared some resistance genes and genetic structures with dog isolates.

Conclusion: Antibiotic treatment caused lasting changes in the canine resistome, highlighting the importance of monitoring AMR recovery and potential dog-human transmission.





Presenter: Kodai Watanabe

Presentation Type and Session: Flashtalk, F5

Level of Study: Master's

Department: Agricultural & Biological Engineering

Advisor: Dr. Alex Thomasson, Professor & Director, Agricultural Autonomy Institute

Title: A Comparative Study of 3D Reconstruction Pipelines and Their Impact on the Simulation-to-Reality Gap in Cotton Boll Detection

Abstract: Simulation is a key tool for developing agricultural deep learning models because of its ability to generate diverse data. However, models trained on synthetic data may perform poorly on real-world data due to the simulation-to-reality (sim2real) gap. While domain randomization and domain adaptation have been widely studied to reduce this gap, the contribution of 3D model quality remains underexplored. Identifying which types of 3D models yield better downstream performance is important because multiple 3D reconstruction pipelines are available. This presentation investigates the influence of outputs from different 3D reconstruction pipelines on deep-learning-based cotton boll detection, an essential component of autonomous cotton harvesting. 3D models of defoliated cotton plants are produced using accessible, non-procedural reconstruction pipelines and placed in simulated environments generated by the Mississippi State University Autonomous Vehicle Simulator (MAVS). By controlling simulation parameters, the influence of 3D model quality on detection performance can be isolated. Simulated images generated from each 3D model are used to train cotton boll detectors, which are evaluated on real-world images to quantify differences in sim2real performance. The study aims to provide practical insights into selecting 3D reconstruction pipelines for simulation-based model training.



Presenter: Larry Leon-Medina

Presentation Type and Session: Flashtalk, F1

Level of Study: PhD

Department: Animal and Dairy Sciences Department

Advisor: Dr. Leyla Rios- Animal and Dairy Sciences

Title: Phenotypic Classification of Kiko Goats Based on Parasite Burden, Health Indicators, and Growth Performance During a Two-Year Grazing Trial in South Mississippi: A Multivariate Approach

Abstract: Gastrointestinal parasites remain a primary constraint to small-ruminant production. The study aimed to characterize phenotypic variation among Kiko goats based on parasite burden, health, and growth performance using a multivariate approach. A two-year trial was conducted in South Mississippi using weaned Kiko bucks grazing warm-season forages without nutritional supplementation. Animals were monitored over a 70-day period, with biweekly measurements. Variables included fecal egg count of nematodes (EPG), coccidia (OPG), FAMACHA®, body condition score (BCS), body weight (BW) and average daily gain (ADG). Animal-level summary variables were subjected to principal component analysis (PCA) and K-means clustering. Differences among clusters were evaluated using analysis of variance and Tukey-adjusted pairwise comparisons. Cluster analysis classified 132 animals into three distinct groups (n=46, 42, 44). PCA and MANOVA confirmed phenotypic separation among clusters ($P < 0.001$). Cluster 1 was characterized by higher FAMACHA®, lower BCS, and the lowest final BW, indicating a susceptible phenotype. Cluster 2 exhibited the lowest EPG, OPG with lower FAMACHA®, suggesting a resistant phenotype. Cluster 3 maintained the greatest final BW and ADG despite relatively high parasite burdens, indicating an intermediate phenotype ($P < 0.005$). The results show variation in host response within the breed and highlight opportunities to improve parasite management in grazing systems.



Presenter: Leonid Carlos Moises

Presentation Type and Session: Flashtalk, F1

Level of Study: PhD

Department: Agricultural Sciences and Plant Protection

Advisor: Dr Luis de Avila, Professor, agricultural Sciences and Plant protection

Co-Advisor: Dr Renan Cantalice de Souza, Professor, Federal University of Alagoas- Brazil

Title: Dynamics of the herbicide Bicyclopyrone in cereal rye (*Secale cereale* L.) straw

Abstract: Crop residues may intercept herbicides, reducing their bioavailability in the soil layer. Although cereal rye has been reported to interact with several herbicide groups, the behavior of HPPD-inhibiting herbicides, particularly bicyclopyrone dynamics in soil amended with rye straw under simulated irrigation, is pivotal for evaluating whether straw-herbicide interactions enhance or affect weed suppression. Residue reduces the amount and rate at which herbicide reaches the soil, thereby decreasing its bioavailability and weed control. Rainfall events increase the release of herbicides from residue into the soil. Our objective was to quantify how residue and simulated rainfall affect herbicide bioavailability in the soil and resulting weed control (teaweed and barnyardgrass). The experimental design was a randomized block design, with 4 replications, organized in a 6 x 2 factorial scheme, with 6 straw levels, and 2 doses of the herbicide, with and without a silicon-based adjuvant. After application, a 14 mm rainfall event was simulated. We evaluated the treatments at 7, 14, 21, and 28 days after application (DAA). The rainfall facilitated the wash-off of herbicide from rye residue into the soil. Barnyardgrass control (nearly 100%) is sustained under this wash-off regime, while teaweed control (80 to 98%) relies more heavily on adjuvant conditions

Presenter: Leticia Mendes

Presentation Type and Session: Poster, P2

Level of Study: Master's

Department: ABE

Advisor: Dr. Vitor Martins, Assistant Professor, Ag & Bio Engineering

Title: Accelerating Building Detection via Geospatial Foundation Model Embeddings in High-Resolution Imagery

Abstract: The growing availability of high-resolution aerial and satellite imagery has created new opportunities for automated building and structure detection in Earth observation. However, processing very high-resolution imagery over large geographic areas remains computationally expensive, particularly when targets occupy only a small fraction of the total scene. This study introduces a semantic similarity-based spatial filtering approach designed to reduce the search space before downstream analysis. A Feature Pyramid Network (FPN) head is trained on top of the Prithvi geospatial foundation model to generate dense embeddings that capture semantic similarity between image regions. During inference, patches surrounding known target structures are used as reference queries, and cosine similarity in the learned embedding space is used to identify candidate regions containing semantically similar structures. The approach was evaluated on high-resolution National Agriculture Imagery Program (NAIP) imagery across residential, industrial, and commercial target classes. Using a cosine-similarity threshold of 0.8, the method reduced the search area by an average of 68.3% while retaining 95.8% of known targets. These results demonstrate that semantic spatial filtering can substantially reduce the amount of imagery requiring subsequent processing while preserving most target-containing regions, supporting its use as a preprocessing stage for larger-scale remote sensing and object detection pipelines.





Presenter: Linyuan Wang

Presentation Type and Session: Flashtalk, F5

Level of Study: PhD

Department: Agricultural & Biological Engineering

Advisor: Dr. Dong Chen

Title: Active Learning-Based UAV Image Annotation and Orthomosaic Mapping for Precision Agriculture

Abstract: Unmanned aerial vehicle (UAV) remote sensing has been widely applied in precision agriculture; however, raw image annotation, model training, and orthomosaic-based result visualization are often handled as separate processes, leading to complex workflows and substantial manual labeling effort. This study presents an integrated UAV image analysis framework that combines active learning-assisted annotation, raw-image-based model training, image rectification, orthomosaic generation, and geospatial mapping. The framework uses original UAV images for model training and inference, while active learning is employed to identify informative samples and reduce annotation workload. Detection results are subsequently transformed into a common geographic coordinate system using image spatial information and projected onto the generated orthomosaic for unified visualization and spatial analysis. The proposed framework establishes an end-to-end workflow from raw UAV imagery and intelligent annotation to model training and orthomosaic-level output, providing an efficient and integrated solution for large-scale UAV image analysis in precision agriculture.



Presenter: LYDIA OGEBULE

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Comparative Biomedical Sciences

Advisor: Dr Janice E. Chambers, Professor, CVM Center for Environmental Health Sciences (CEHS)

Title: Oxime 20 Preserves Mitochondrial Integrity Following Organophosphate-Induced Calcium Overload in B35 Cells

Abstract: Organophosphates (OPs) induce severe neurotoxicity through acetylcholinesterase (AChE) inhibition, leading to hypercholinergic overstimulation and downstream neurodegeneration. The novel reactivator Oxime 20 (US patent 9,277,937), developed in our lab, penetrates the BBB, and reactivates OP-inhibited AChE unlike current treatments like 2-PAM. This study evaluated the effects of the sarin surrogate nitrophenyl isopropyl methylphosphonate (NIMP) and novel Oxime 20 therapy on mitochondrial membrane potential (MMP) in B35 neuroblastoma cells. Exposure to 100 nM NIMP induced significant mitochondrial depolarization, reducing the JC-10 red-to-green fluorescence ratio by ~72% relative to the control. Pretreatment with the calcium chelator BAPTA-AM significantly attenuated this depolarization, confirming that NIMP-induced mitochondrial failure is calcium-dependent. Furthermore, Oxime 20 therapy preserved mitochondrial integrity, significantly normalizing the ratio toward baseline. Thus, Oxime 20 confers neuroprotection by interrupting calcium-dependent mitochondrial collapse. (Supported by NIH U01 NS123255)



Presenter: M A Batin

Presentation Type and Session: Poster, P5

Level of Study: Master's

Department: Agricultural & Biological Engineering

Advisor: Dr Lucas Borges Ferreira, Assistant Professor, Agricultural & Biological Engineering

Title: Bridging the sim-to-real gap in synthetic data generation for automated sweet potato grading

Abstract: Manual grading of sweet potatoes in a packing facility is labor-intensive and prone to inconsistencies from human error. Automating this process requires machine vision models trained on thousands of annotated samples, where per-pixel masks are costly to produce, and physical measurements such as volume are impractical to collect at scale. Synthetic data generation can reduce this dependence on real annotated data. In this work, we explore the effectiveness of synthetic data in training computer vision models and measure the sim-to-real gap when those models are evaluated on real-world data. Our work develops a synthetic data generation pipeline in NVIDIA Isaac Sim that produces labeled RGB and depth imagery for two vision tasks central to packing-line grading: instance segmentation of roots and volume estimation. We show that our approach to synthetic data generation, with both environment and instance-level scene randomization, narrows the sim-to-real gap. On a real-world holdout set, a segmentation model trained purely on synthetic data reached a mask mAP50 of 0.970 versus 0.991 for a model trained on real images. For volume estimation, a multi-linear regression model trained on synthetic data achieved an RMSE of 26.20 cm³, matching the best published model trained on real measurements (26.30 cm³).



Presenter: Mahfuzur Rahman

Presentation Type and Session: Flashtalk, F4

Level of Study: PhD

Department: Electrical and Computer Engineering

Advisor: Dr. John E. Ball, Professor, Electrical and Computer Engineering

Title: Pedestrian Tracking and Trajectory Prediction Using YOLOv11 and a Goal-Conditioned LSTM Integrated with ByteTrack and ReID for Intersection Navigation

Abstract: Accurate pedestrian detection, tracking, and trajectory prediction are essential for safe autonomous vehicle intersection navigation, where dense interactions, occlusions, and uncertain pedestrian behavior pose significant challenges. Existing methods often rely on computationally intensive models or treat tracking and prediction as separate tasks, leading to identity inconsistencies and reduced forecasting accuracy. This project presents a lightweight and unified framework for real-time pedestrian tracking and trajectory prediction. The approach integrates YOLOv11 for robust pedestrian detection, a ByteTrack-inspired multi-object tracker enhanced with ReID for consistent identification under occlusion, and a goal-conditioned Long Short-Term Memory (LSTM) network for trajectory forecasting. Scene-level context is incorporated by automatically deriving candidate pedestrian goals through clustering of trajectory endpoints, enabling goal-directed predictions without requiring high-definition maps or traffic signal information. In addition to benchmark data, a custom annotated pedestrian dataset is developed to capture intersection-specific scenarios, including varying densities and occlusions. The framework is trained and evaluated on MOT17 (MOT17-02-FRCNN, MOT17-05-FRCNN, and MOT17-09-FRCNN) sequences and the custom dataset. Performance is assessed using Average Displacement Error (ADE) and Final Displacement Error (FDE) for trajectory prediction, while tracking outputs are provided in MOTChallenge format for evaluation with metrics such as MOTA and IDF1.



Presenter: Manal Bouchlouch

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Sustainable Bioproducts

Advisor: Dr. Mostafa Mohammadabadi, Assistant Professor, Sustainable Bioproducts

Title: Listening for Gaps: Nondestructive Evaluation and Bending Performance of Delaminated Glue Laminated Timber

Abstract: Adhesive delamination in glued laminated timber (glulam) can compromise structural performance but is difficult to detect without damaging the member. Glulam is widely used in buildings and bridges because it spans long distances at relatively low weight. This study evaluated whether stress-wave time-of-flight (ToF) testing can detect, locate, and gauge the severity of glue-line discontinuities in 5- and 6-layer glulam beams, and how those discontinuities affect bending behavior. Thickness-wise ToF measurements reliably flagged the delaminated region and showed a clear severity response, regardless of beam length or delamination area. Depth-wise (incremental) ToF testing then identified which internal glue line contained the flaw, even with the natural variability of wood. Longitudinal and width-wise measurements were much less dependable, reflecting how strongly wave propagation direction matters when waves travel parallel to the glue interfaces. To link detection to mechanical performance, beams were tested to failure in four-point bending. Dynamic stiffness from stress-wave testing (MOEd) varied little among configurations, and neither delamination location nor beam length had a significant effect ($p > 0.96$). Static stiffness (MOEs) depended on beam length rather than delamination location, and the length effect was the same wherever the delamination was placed. Delamination location mainly influenced failure mode, shifting the governing mechanism between the shear zone and the shear-free zone, with delamination in the end zone being most critical and its effect more pronounced in shorter beams. Finally, MOEd remained strongly correlated with MOEs, and this relationship was unaffected by delamination location or beam length. Overall, thickness-wise ToF testing proved the most effective approach for finding and locating glue-line discontinuities in glulam.



Presenter: Manoj Kumar Reddy Allam

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr. Raju Bheemanahalli, Associate Professor, Plant and Soil Science

Title: Impact of Salinity Stress on Leaf Pigments, Yield, and Grain Nutrition

Abstract: Rice (*Oryza sativa* L.) is classified as a salt-sensitive crop; however, its sensitivity varies with growth stages. The impact of salinity during the seedling and early vegetative stages is well documented. Studies have shown that the rice seedling stage is sensitive to salt but can recover from moderate salinity. In contrast, the effects of salinity during the reproductive stages are less well understood, and, moreover, damage is often irreversible. Screening and identification of salt-tolerant rice during reproductive stages are crucial for breeding and managing productivity in the field. Salt stress during flowering and grain development can reduce yield and seed nutrition. In this study, 15 rice genotypes were exposed to a control (0 NaCl) and a salt stress (7 dS/m NaCl) during the reproductive stage to quantify pigment- and yield-related parameters. Under salt stress, the chlorophyll index dropped from 30.9 $\mu\text{g}/\text{cm}^2$ at 7 days after treatment (DAT) to 17.61 $\mu\text{g}/\text{cm}^2$ at 21 DAT (a decrease of 43.2%). Moreover, salt stress decreased spikelet fertility to 24.1%, with values under stress ranging from 38.6% (20NTPID-182) to 90.0% (IR 2066-P12-2-2). 6 genotypes recorded more than a 40% yield reduction under stress. 20NTPID-037 and 20NTPID-169 recorded the highest yields, while XP753 had the lowest yield compared with the other genotypes under salt stress. Grain nutrient accumulation varied significantly among genotypes and treatments under salinity. Nitrogen ranged from 0.81% to 1.90%, zinc from 23.7 to 47.0 ppm, iron from 11.7 to 56.7 ppm, and grain sodium from 0.013% to 0.083%, reflecting genotypic differences in sodium accumulation and micronutrient uptake. Among all the genotypes CLL 18 exhibited the strongest composite salt tolerance under salt stress, while 20NTPID-270 showed superior grain nutritional quality with low grain Na^+ accumulation, making both genotypes promising candidates for developing salt-tolerant, nutritionally rich rice varieties.



Presenter: Marionei Fomaca de Sousa Junior

Presentation Type and Session: Flashtalk, F4

Level of Study: PhD

Department: Agricultural and Biosystems Engineering

Advisor: Dr Sayantan Samanta, Professor, Agricultural and Biosystems Engineering

Co-Advisor: Dr Prem Parajuli, Professor, Agricultural and Biosystems Engineering

Title: A Scalable Framework Coupling SWAT+ and Machine Learning for Continuous Water Quality Estimation

Abstract: Water quality degradation is a leading cause of harmful algal blooms (HABs), affecting 44% of all rivers in the United States. However, only a small proportion of these rivers are monitored, which restricts the ability to characterize continuous nutrient dynamics necessary for HAB prevention and mitigation efforts. Although process-based models, such as Soil and Water Assessment Tool Plus (SWAT+), can simulate hydrological processes and nutrient transport, configuring a model for each watershed requires substantial time, data, and expertise. To address these issues, this study integrated machine learning with process-based modeling to estimate water quality parameters for any stream in the contiguous United States. An automated SWAT+ pipeline was developed to generate complete model packages using only the watershed outlet location as input. The pipeline is capable of automatically retrieving all inputs, delineating watersheds, and executing models. Using feature engineering, SWAT+ outputs will be selected to generate inputs for machine learning models, which will be trained on discrete observations from in-situ USGS monitoring stations. This framework is expected to produce continuous daily nutrient and sediment concentrations in watersheds with limited or no monitoring, thereby supporting national-scale water quality assessment and management.



Presenter: Md Ebtidaul Karim

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Electrical and Computer Engineering

Advisor: Dr. John Ball, Electrical and Computer Engineering

Co-Advisor: Dr. Volkan Senyurek, Geosystem Research Institute

Title: Investigation of Machine Learning Models for Field Scale Soil Moisture Mapping via UAV-Based GNSS-R, Multispectral Camera, and LiDAR

Abstract: Accurate field-scale soil moisture (SM) mapping is essential for precision agriculture and efficient water management. This study develops a machine-learning framework using multimodal observations collected by an unmanned aerial system (UAS) to estimate high-resolution SM over 210×110 m (2.31 ha) corn and cotton fields at Mississippi State University's research farm. In-situ SM measurements obtained from soil moisture probes were used as ground-truth observations. The dataset spans three growing seasons (2021–2023) and integrates Global Navigation Satellite System Reflectometry (GNSS-R) observations with multispectral vegetation indices, LiDAR-derived canopy information, and temporal and platform-related features to characterize soil-vegetation interactions. Three machine learning models, namely Random Forest (RF), Extreme Gradient Boosting (XGBoost), and Long Short-Term Memory (LSTM), were evaluated using K-fold cross-validation. Multiple feature-selection approaches were also investigated to identify informative predictor subsets and assess their influence on model performance. The models demonstrated the capability of multimodal UAS observations to estimate spatial variations in field-scale SM, with tree-based approaches showing particularly strong predictive performance. The resulting SM estimates demonstrate the potential of integrating GNSS-R with complementary remote-sensing observations for high-resolution agricultural monitoring. Future work will focus on more rigorous spatial, temporal, and cross-crop validation and improving model generalization for operational precision-agriculture applications.



Presenter: Md Masiat Roushan Masrafee

Presentation Type and Session: Flashtalk, F4

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dr. Hussein Gharakhani, Assistant Professor, Agricultural and Biological Engineering

Title: Autonomous plastic debris retrieval in cotton fields: integrating GNSS navigation, computer vision, and robotic manipulation on an Amiga platform

Abstract: Cotton is a vital agricultural and economic staple in Mississippi, but plastic contamination, including stray bags and module wraps, costs the U.S. cotton industry an estimated \$600-\$750 million in losses annually. This project presents an automated plastic retrieval system integrating an AMIGA agricultural rover, GNSS waypoint navigation, an OAK-D stereovision camera, and a custom robotic arm. The rover follows the crop as a strict one-dimensional track by using a custom Mission Control graphical user interface (GUI) and GNSS data to drive perfectly straight down the row's centerline. As it approaches the projected location of the plastic bag, it activates the OAK-D camera. The vision system localizes the plastic and micro-adjusts the rover's forward position until the debris falls precisely into the robotic arm's workspace. The arm then moves to the target and retrieves the bag. After each retrieval attempt, the camera rescans the area to verify success. If the pickup fails, the system alerts the operator and prompts a retry or skip decision, which makes it a closed-loop system. By successfully combining GPS navigation, vision verification, and robotic manipulation, this closed-loop system offers a practical, automated solution to remove field contaminants, protect crop quality, and prevent millions of financial losses.



Presenter: Md Masiat Roushan Masrafee

Presentation Type and Session: Poster, P5

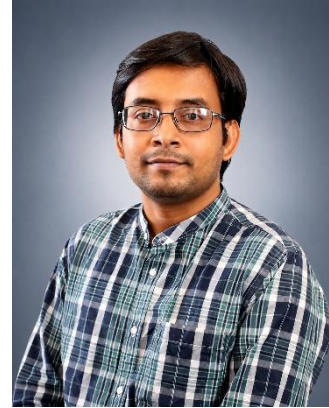
Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dr. Hussein Gharakhani, Assistant Professor, Agricultural and Biological Engineering

Title: Integrated perception, coupled kinematics, and digital-twin-assisted validation of a 9-DOF dual-arm robotic manipulator for agricultural applications

Abstract: Labor shortages in agriculture have increased the need for robotic systems that can perform harvesting and other repetitive tasks efficiently. However, improving robotic throughput is challenging because conventional single-arm systems generally handle one target at a time. To address this limitation, this work presents the design and fabrication of a novel 9-DOF robotic manipulator consisting of two 3-DOF mini-arms mounted on a shared 3-DOF Cartesian gantry. This architecture allows two targets to be reached simultaneously, but it also creates a coupled control problem because the shared gantry position affects both mini-arms. To operate the system, a complete perception-to-execution pipeline was developed. A stereo camera and YOLO-based vision system detect targets and estimate their 3D positions. A custom analysis tool identifies feasible target pairs, evaluates task planning strategies, and solves high-dimensional inverse kinematics for gantry position and mini-arm orientation. A digital twin visualizes target locations, paired targets, arm configurations, and possible collision conditions before execution. The calculated motions are then transferred to the fabricated physical prototype for coordinated dual-arm operation. The developed system demonstrates not only a novel robotic architecture but also a complete integrated framework from target detection and localization through kinematic analysis, digital-twin visualization, and physical execution.



Presenter: Md Moniruzzaman

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Electrical and Computer Engineering

Advisor: Dr. Seungdeog Choi, Professor, Electrical and Computer Engineering

Title: Real-time Multivariate Lifetime Prediction of IGBT Power Switches under Sensor Degradation

Abstract: Power converters in electric vehicles, renewable energy, and industrial equipment depend on power semiconductor switches such as insulated-gate bipolar transistors (IGBTs), and the switch wears out first. Repeated heating and cooling fatigues the bond wires and solder inside the switch until it fails and the converter stops. This research predicts the remaining useful life of the switch in real time from signals the converter already measures, so maintenance can be planned before failure. A multivariate long short-term memory (LSTM) neural network fuses on-state voltage, collector current, and case temperature, and is trained on deliberately corrupted data so it remains trustworthy when its own sensors drift, lose gain, or pick up noise. Multiple IGBTs were aged to failure on an accelerated power-cycling testbed. On a device not used in training, the multivariate model nearly halved the end-of-life prediction error compared with the conventional single-signal approach. When sensors drifted, lost gain, or became noisy, single-signal predictions went far off while the proposed model stayed close to the true remaining life. The model runs in real time on a low-cost embedded GPU, enabling practical predictive maintenance of power converters.

Presenter: MD SAIFUL HASAN

Presentation Type and Session: Flashtalk, F3

Level of Study: PhD

Department: Department of Sociology

Advisor: Independent Research

Title: Choosing Pets, Choosing Selves: Pet Preference and Identity Negotiation among College Student Pet Owners

Abstract: This study brings identity negotiation, college life, and human–pet relationships into a single sociological analysis. Drawing on interview data, this study examines how pet preferences are connected to the ways college student pet owners understand and negotiate the self. Drawing on Bourdieu’s concepts of habitus, taste, and distinction and Goffman’s dramaturgical framework, the study examines the social shaping of pet preferences and their role in identity negotiation. It investigates how participants’ preferences are connected to personality and temperament, taste and status, aesthetic self-understanding, gender norms, family and regional culture, religious boundaries, and desired role identities. It also investigates how these socially shaped preferences become identity-relevant through interaction. The study overall investigates how pet preference provides a sociological site for examining how socially patterned tastes and dispositions become part of identity through social interaction in and beyond everyday college life.

Keywords: Identity Negotiation; Pet Preference; Human–Pet Relationships; Social Interaction





Presenter: Menaka Konara

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Department of Mechanical Engineering

Advisor: Dr. Soroush Korivand, Assistant Professor, Department of Mechanical Engineering

Title: From Muscle Signals to Hand Intent: Machine Learning for Finger, Action, and Force Decoding

Abstract: Upper-limb loss severely limits independence in daily activities, and a prosthetic hand can restore it only if it reliably recognizes the user's movement intentions. Natural, dexterous control requires knowing which finger the user wants to move, in which direction, and with how much force, so objects are handled with the intended finger and the right effort. Surface electromyography (sEMG) offers a practical, noninvasive signal for decoding these intentions in real time. We present a machine learning approach addressing all three tasks: identifying the active finger, classifying flexion versus extension, and estimating continuous fingertip force. sEMG and fingertip force were recorded from 33 able-bodied participants, and seven time-domain features were extracted from each 200 ms window per sEMG channel, yielding 56 features per window. Two classical models, XGBoost and Random Forest, were compared with a transformer-based foundation model, the Tabular Prior-data Fitted Network (TabPFN), under within-participant and leave-one-participant-out (LOPO) regimes. For within participant models, TabPFN performed best, reaching a mean R^2 of 0.933 ± 0.024 for force and accuracies of 0.973 ± 0.014 and 0.893 ± 0.030 for action and finger classification. Under LOPO, Random Forest gave the best force R^2 (0.740 ± 0.098), and XGBoost the best classification (0.835 ± 0.048 for action, 0.589 ± 0.084 for finger), reflecting limited generalization to unseen participants.



Presenter: Michelle Roy

Presentation Type and Session: Flashtalk, F1

Level of Study: PhD

Department: Biochemistry, Nutrition and Health Promotion

Advisor: Dr. Carrie Vance, Associate Professor, Biochemistry, Nutrition, and Health Promotion

Co-Advisor: Dr. Andrew Kouba, Head Dale H. Arner Professor of Wildlife Ecology and Management, Wildlife, Fisheries and Aquaculture

Title: Permeability and Developmental Responses of Fowler's Toad (*Anaxyrus fowleri*) Embryos to Cryoprotectants

Abstract: Amphibian embryos are difficult to vitrify because of their large size, dense yolk, and high water content. Vitrification of other non-mammalian embryos, such as fish, has recently succeeded using cryoprotectant formulations tailored to their toxicity and permeability profiles, suggesting similar screening would benefit amphibians. Here, we conducted a high-throughput toxicity and permeability screen of 19 cryoprotectant agents (CPAs), spanning hydrophilic, lipophilic, and nitrogen-containing compounds, each at 1.5 M. Fowler's toad (*Anaxyrus fowleri*) embryos ($n=3,535$) were produced by in-vitro fertilization and de-jellied with 2% cysteine at early cleavage. Embryos (≥ 80 /treatment) were exposed to each CPA for five minutes, rinsed, and monitored through cleavage, gastrulation, and hatching relative to controls. A subset from each treatment was imaged every two seconds during exposure, and custom computer vision code quantified volume change to characterize permeability from shrink–swell dynamics. Four lipophilic compounds were highly toxic, causing embryo death, while 13 CPAs were non-toxic based on development to the free-swimming tadpole stage. GLM on free-swimming embryos found no significant differences among non-toxic CPAs ($p=0.74$), and 10 showed rapid, high permeability. These 10 permeable CPAs provide an initial candidate library for designing multi-component solutions and protocols for amphibian embryo vitrification and biobanking.



Presenter: Miguel Montufar

Presentation Type and Session: Poster, P3

Level of Study: Master's

Department: Wildlife, Fisheries & Aquaculture

Advisor: Dr. T. I. Heckman, Professor, Wildlife, Fisheries and Aquaculture

Co-Advisor: Dr. M. Ruiz-Aravena, Professor, Wildlife, Fisheries and Aquaculture

Title: Evaluating Bacteremia as a Predictor of *Edwardsiella ictaluri* Infection Outcome in Channel Catfish (*Ictalurus punctatus*).

Abstract: *Edwardsiella ictaluri* is a gram-negative bacterium that causes enteric septicemia of catfish (ESC), an important disease in United States aquaculture. Infection occurs through oral-fecal routes and entry at mucosal sites via gills, skin, nares, and gut, followed by colonization, invasion and systemic dissemination. The bacterium survives intracellularly in macrophages through mechanisms such as iron acquisition, urease activity, and formation of *Edwardsiella*-containing vacuoles (ECV). Bacteremia is thought to be critical for disease progression, as high bacterial loads are associated with increased bacterial virulence, leading to immune evasion, host cell damage, and mortality. In contrast, low bacteremia indicates effective immune control and improved infection clearance. This study aimed to quantify bacteremia post-*E. ictaluri* challenge to determine whether early bacterial loads are correlated with individual survival outcomes: acute mortality, chronic infection, or bacterial clearance.



Presenter: Moeen Ul Islam

Presentation Type and Session: Flashtalk, F5

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dr. Dong Chen, Assistant Professor, Agricultural and Biological Engineering

Co-Advisor: Dr. J. Alex Thomasson, Director, Agricultural Autonomy Institute; Professor, Agricultural and Biological Engineering

Title: Spatially Weighted Radiometric Calibration Using Automated Ground Control Points for UAV Agricultural Imagery

Abstract: This study evaluates a spatially weighted radiometric calibration method for UAV-based multispectral agricultural imagery using Automated Multispectral Ground Control Points (AMGCPs). Conventional radiometric calibration often relies on reference targets distributed throughout the field, increasing setup time and field effort. Using a multispectral dataset containing nine AMGCP observations, calibration coefficients were estimated from nearby AMGCP measurements, with greater weight assigned to spatially closer observations, and compared with a conventional global mean calibration approach. The spatially weighted method consistently improved agreement with reference reflectance measurements across the evaluated spectral bands. The best-performing nearest-two weighting strategy reduced calibration RMSE by approximately 46% relative to the global mean method, demonstrating that localized calibration can better account for spatial variability in illumination and imaging conditions. The results also support the practical use of AMGCPs as an automated calibration framework that may reduce the need to manually distribute conventional calibration targets across an entire field. Overall, the approach offers a more efficient, repeatable, and scalable strategy for radiometric calibration of UAV multispectral imagery in precision agriculture.



Presenter: Moeen Ul Islam

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dong Chen, Assistant Professor, Agricultural and Biological Engineering

Title: Argus Omnimotus: An Open-Source Modular Swerve-Drive Robot Platform for Agricultural Robotics Research and Education

Abstract: Agricultural production faces persistent labor shortages and increasing demand for automation, yet progress in agricultural robotics remains constrained by the limited availability of affordable, flexible, and accessible research platforms. This paper presents Argus Omnimotus, an open-source, modular, low-cost agricultural robotics platform designed for autonomy research and hands-on education. The platform integrates four-wheel independent swerve drive, swappable computing, distributed embedded control, multimodal sensing, and configurable manipulation within a unified sense-plan-act-verify framework supporting perception, control, navigation, manipulation, and autonomous task verification. The platform was evaluated through representative row-crop navigation and manipulation tasks under varying lighting and soil conditions. Experiments demonstrated reliable lane following, autonomous row-to-row navigation, target identification, seed dispensing, plant manipulation, and closed-loop verification of task success. Its modular architecture supports independent testing, modification, and validation of autonomy components for rapid prototyping and experimentation. These proof-of-concept manipulation tasks, together with controller-tuning studies and integrated testbed trials, demonstrate the platform's suitability for both autonomy research and hands-on instruction in robotics, embedded systems, computer vision, and autonomous decision-making. By combining affordability, modularity, open-source accessibility, configurable manipulation, and end-to-end sense-plan-act-verify autonomy, Argus Omnimotus provides a practical platform for agricultural robotics research, technology development, and workforce training.



Presenter: Mohamed Naziq

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dr. Sayantan Samanta, Assistant Professor, Agricultural and Biological Engineering

Title: Simulating Soil Water Dynamics Under Conventional and Regenerative Agricultural Practices to Support Improved Furrow Irrigation Management in the Lower Mississippi Delta

Abstract: The Lower Mississippi Delta is a major cotton-producing region primarily supported by irrigation from the Mississippi River Valley Alluvial (MRVA) Aquifer. Over the last decade, changing weather patterns combined with the low efficiency of furrow irrigation have intensified withdrawals from the MRV Aquifer. Hence, it is extremely critical to improve the efficiency of the furrow irrigation system to enhance agricultural sustainability in the area. The primary goal of this study is to develop a process-based modeling framework to better understand soil-water dynamics in furrow irrigated cotton. The DSSAT-CROPGRO-Cotton model was parameterized for three-year experiment at Stoneville, Mississippi which included a conventional tillage and six conservation tillage and winter cover crop treatments across 21 plots. A total of 17 DSSAT models were developed to represent the variability across three soil series and management treatments across the field. The models will be evaluated for soil moisture, applied irrigation and lint yield using Root Mean Square Error (RMSE) and coefficient of determination (R^2). The modeling framework will then be employed to evaluate water use efficiency of different irrigation strategies under varying environmental conditions. Results from this study will be useful for producers to better optimize irrigation while conserving valuable water resources.



Presenter: Mohammad A. Ghanbari

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Institute for Genomics, Biocomputing & Biotechnology

Advisor: Dr. George V. Popescu, Associate Research Professor, Institute for Genomics, Biocomputing and Biotechnology

Title: System-level integration of phenomics, metabolomics, and proteomic responses in cowpea genotypes under early-stage drought stress reveals mechanisms of resistance

Abstract: Drought tolerance in cowpea involves genotype-specific physiological and molecular responses that extend beyond changes in total protein abundance. Three cowpea genotypes—Arkansas Blackeye #1 (ARB), Top Pick Cream (TPC), and X17-111—were evaluated under well-watered, intermediate drought, and drought-stress conditions using physiological and biochemical phenotyping, label-free quantitative proteomics, weighted protein co-abundance network analysis, junction-resolved proteogenomics, and group-aware molecular modeling. Water limitation reduced growth and photosynthetic pigment levels in all genotypes; however, ARB exhibited greater retention of chlorophylls, carotenoids, phenolics, flavonoids, sucrose, and total soluble sugars, supporting its superior drought tolerance under the conditions tested. Conventional proteomics revealed genotype-specific changes in proteins associated with photosynthesis, redox regulation, proteostasis, and organelle function. In ARB, stress-associated proteins including SYT7 and SERPIN1 increased, while NTRC, RBCL, LHCA6, and other chloroplast proteins showed marked drought-responsive changes. Gene Ontology and KEGG analyses highlighted processes such as protein folding, heat and hypoxia responses, oxidative stress, peroxisomal functions, photosynthesis, RNA-associated processes, and chloroplast organization. Weighted gene co-expression network analysis (WGCNA) assigned 2,532 proteins to 34 non-grey modules and identified trait-associated networks containing proteins involved in photosystem assembly, chloroplast RNA metabolism, redox regulation, mitochondrial metabolism, photorespiration, and protein homeostasis. Junction-resolved proteogenomics identified 1,735 high-confidence peptides spanning annotated exon-exon junctions.



Presenter: Mohammad Alizadeh Poshtiri

Presentation Type and Session: Flashtalk, F2

Level of Study: PhD

Department: Physics and Astronomy

Advisor: Prabhakar Pradhan

Title: Speckle free label free imaging of biological cells and tissues using random laser illumination

Abstract: Laser based biomedical imaging is widely valued for its high brightness and directional illumination; however, it is fundamentally constrained by speckle noise, a consequence of the high spatial coherence inherent to laser light. These speckle artifacts degrade image contrast, obscure fine structural details, and reduce quantitative accuracy. Such limitations are particularly pronounced in wide field and deep tissue imaging contexts. Random lasers (RLs) have the potential to transform applications into disease diagnostics, tissue imaging, and BioNanoPhotonic technologies by providing laser level brightness with low spatial coherence, resulting in speckle free, label free biomedical imaging. Conventional incoherent sources, such as LED lamps, can reduce speckle but fall short of the brightness required for high resolution biological imaging due to their low Photon Degeneracy and Spectral Radiance. Unlike conventional lasers, RLs do not rely on a defined optical cavity; instead, light amplification is achieved through coherent feedback from multiple scattering events within a disordered gain medium, making them effectively mirrorless laser sources. Through an ongoing interdisciplinary collaboration between the Physics and Chemistry Departments, random lasing has been successfully demonstrated across several disordered gain media, including dye doped polymer bead systems and CsPbBr₃ based platforms in both liquid and fiber configurations. We also collaborate with the College of Veterinary Medicine at Mississippi State University for tissue imaging. High contrast, speckle free imaging of biological cells/tissues has also been confirmed, providing strong proof of concept for RL based biomedical illumination.



Presenter: Mohammad Shamoushaki

Presentation Type and Session: Flashtalk, F5

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dr. Soroush Korivand, Assistant Professor, Mechanical Engineering

Co-Advisor: Dr. Hussein Gharakhani, Assistant Professor, Agricultural and Biological Engineering

Title: Learning from Demonstration for Robotic Fruit Approach Under Partial Occlusion

Abstract: Robotic fruit harvesting is challenging when fruit is partially occluded by leaves, stems, and other plant structures. Fruit detection alone is not sufficient because the robot must also select a safe approach path through surrounding foliage. This study investigated a Learning from Demonstration framework for vision-guided robotic fruit approach under partial occlusion. An Intel RealSense D405 RGB-D camera was mounted on a UR10e manipulator in an eye-in-hand configuration. Compact visual features described fruit image-plane offset, fruit distance, nearest-leaf distance, and foliage distribution. Six expert Cartesian-teleoperation demonstrations were used to train behavior-cloning and diffusion-based policies. During deployment, the policies generated closed-loop target TCP poses without explicit occlusion labels, detailed collision models, reward design, or manually programmed approach rules. The system was evaluated in 42 indoor trials with artificial fruit and foliage under three occlusion levels. It achieved an overall success rate of 85.7%, while both policies operated at approximately 30 Hz. Failures were mainly related to inaccurate fruit-depth estimation and foliage perception. The results show that compact RGB-D features and expert demonstrations can support real-time approach behavior toward partially occluded fruit.



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Presentation Type and Session: Poster, P5

Level of Study: PhD

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Presenter: Mohan K. Bista

Presentation Type and Session: Flashtalk, F1

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr. Raju Bheemanahalli, Associate Research Professor, Plant and Soil Sciences

Title: Genotype $\times$ Environment Interaction and Multi-Trait Stability of Cotton

Abstract: Cotton yield and quality vary significantly between irrigated and rainfed systems. Understanding the genotype (G) $\times$ environment (E) interaction (GEI) is critical for predicting cotton yield and quality, yet it has not been examined comprehensively. This study evaluated the GEI and stability of 16 genotypes across 15 environments. Multiple statistical models, including the random-effects, additive main effects and multiplicative interactions (AMMI), genotype plus genotype-vs-environment interaction (GGE), and multi-trait stability index (MTSI), were employed. Results showed that environmental variance accounted for the largest share of total phenotypic variance across all traits. Genotypic variance was higher for quality traits than for lint yield. GEI variance was $< 10\%$ for all traits except the fiber quality index (Q-score). Seasonal weather variables were weakly associated with trait variation across environments. A notable trade-off was observed among the traits for the selection differential. Genotypes DG 4530 B3XF and DG 3528 B3XF were identified as the most productive and stable in joint performance across lint yield and fiber quality traits. Our findings suggest that including stability evaluations in multi-trait selection helps breeders and agronomists identify genotypes that are both highly productive and resilient across diverse environments.



Presenter: Mohan K. Bista

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr. Raju Bheemanahalli, Associate Research Professor, Plant and oil Sciences

Title: Beyond Leaves: Cotton Bract Physiology Under Drought Stress

Abstract: Improving source-sink equilibrium by enhancing the physiology of non-leaf-green organs may help sustain cotton yield under drought. Although drought-induced leaf (the primary source organ) physiology has been extensively studied, bract physiology (a secondary source organ) under drought is poorly understood. Ten diverse cotton genotypes were subjected to two soil moisture regimes: (i) control, irrigated to replace 100% evapotranspiration (ET), and (ii) drought stress, ~ 50% ET of the control during the reproductive stage. Most bract phenotypes responded to drought like leaves but showed greater stability and significant genotypic variation. For example, drought-induced decline in stomatal conductance was significantly lower in bracts than in leaves (39% vs. 73%). Under drought, quantum efficiency of photosystem II, electron transport rate, and stomatal density were stable in bracts, in contrast to significant declines in leaves. Drought-induced increase in thermal load was highest in leaves (7°C), followed by bolls (3°C) and bracts (2°C). Across genotypes, drought reduced seed cotton yield by 50%, whereas reductions in fiber quality traits were <15%. Bract pigments showed multivariate associations with yield components under drought, indicating breeding potential. Collectively, these findings suggest that bract traits could serve as useful selection criteria for identifying drought-tolerant genotypes among agronomically desirable genotypes.



Presenter: Montana Jane Lang

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Industrial and Systems Engineering

Advisor: Dr. Jessica M. Gonzalez-Vargas

Title: Virtual Reality Simulation for Endovascular Coiling Training: Current Approaches and Development of an Immersive Training Environment

Abstract: Endovascular coiling is the preferred treatment for cerebral aneurysms since it is associated with improved patient outcomes. However, it is a complex procedure that requires advanced technical skills to navigate a microcatheter through the radial artery to the aneurysm. Successful coiling depends on operator skill, experience, and proficiency. However, current simulation-based training for endovascular coiling remains limited and may not adequately replicate the complexities of the procedure. Therefore, this abstract describes the development of an immersive virtual reality (VR) training system for endovascular coiling. We first conducted a literature review to identify the most common steps involved in the procedure. These steps were then prioritized based on clinician feedback and are being developed in Unreal Engine for use with a Meta Quest headset. The current VR training prototype includes a hospital room, patient model, procedural table, radial access site, cerebral vasculature and aneurysm anatomy, and interactive endovascular instruments to be used for steps in the coiling procedure. Future work will include completion of the VR system, clinician validation, usability, and potential effectiveness as a training tool for endovascular coiling education. This work may contribute to the development of accessible and immersive simulation approaches for training complex endovascular procedures.



Presenter: Muhammad Hamza

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Department of Sustainable Bioproducts

Advisor: Prof. El Barbary Hassan, Department of Sustainable Bioproducts

Title: Removing the Unremovable: Cellulose Changed Water's Story

Abstract: Per- and polyfluoroalkyl substances (PFAS), commonly known as “forever chemicals,” are harmful pollutants that can remain in water and the environment for a very long time. Removing these chemicals from contaminated water is challenging. In this study, we developed a sustainable, highly efficient composite aerogel to remove PFAS from water quickly. We synthesized the aerogel using a simple, one-step process that combines a metal-organic framework (MIP-202) with cellulose nanofibers derived from natural materials. Adding the cellulose increased the material's surface area, providing more sites for PFAS to attach. The novel green aerogel was tested with two common PFAS chemicals: PFOS and PFHxA. It removed PFOS from water in less than 10 seconds and PFHxA in less than 30 seconds under environmentally relevant conditions. The results suggest that PFAS removal occurs through a combination of attraction between the chemicals and the aerogel's surface and water-repelling interactions. Importantly, the aerogel maintained its performance after four reuse cycles, showing strong potential for rapid, sustainable, and reusable PFAS removal from contaminated water.



Presenter: Muhammad Hamza

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Department of Sustainable Bioproducts

Advisor: Prof. El Barabary Hassan, Sustainable Bioproducts

Co-Advisor: Dr. Islam Elsayed, Department of Sustainable Bioproducts

Title: Ultra-Fast PFAS Removal from Water Using a Sustainable Aerogel

Abstract: Per- and polyfluoroalkyl substances (PFAS), often called “forever chemicals,” are persistent contaminants widely detected in water and linked to adverse environmental and health effects. This study developed a sustainable aerogel for ultra-fast PFAS removal from water. We used a one-pot hydrothermal approach to synthesize an in situ MIP-202/TOCNF composite aerogel by replacing 50% of the aspartic acid linker in the MIP-202 metal-organic framework with TEMPO-oxidized cellulose nanofibers (TOCNF). The resulting composite exhibited a surface area of 129.6 m²/g, representing a 26.7% increase compared with pristine MIP-202. The aerogel demonstrated ultra-fast adsorption of perfluorooctane sulfonic acid (PFOS) and perfluorohexanoic acid (PFHxA), achieving removal within less than 10 and 30 s, respectively, under environmentally relevant conditions. Adsorption followed second-order kinetics and the Freundlich isotherm model, with maximum adsorption capacities of 157.1 and 38.5 mg/g for PFOS and PFHxA, respectively. Density functional theory calculations indicated that PFAS adsorption was governed by synergistic electrostatic and hydrophobic interactions. The aerogel also maintained its adsorption performance over four cycles, demonstrating its potential as a sustainable material for rapid PFAS remediation.



Presenter: Muhammad Husnain Manzoor

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Department of Sustainable Bioproducts

Advisor: Dr. El Barbary Hassan, Professor, Sustainable Bioproducts

Co-Advisor: Dr. Islam Elsayed, Assistant Research Professor, Sustainable Bioproducts

Title: Heterogeneous catalytic conversion of glucose into 5-hydroxymethylfurfural (HMF) using $\text{Fe}_3\text{O}_4/\text{SiO}_2\text{-Al}_2\text{O}_3$ magnetic catalyst

Abstract: The catalytic conversion of glucose into 5-hydroxymethylfurfural (HMF) is a critical step in producing renewable platform chemicals and biobased fuels but its production remains challenging due to byproducts. In this work, a novel cost-effective Fe monometallic catalyst supported on silica-alumina ($\text{Fe}_3\text{O}_4\text{-SiO}_2/\text{Al}_2\text{O}_3$) was synthesized via co-precipitation and comprehensively characterized by FTIR, TGA, BET, SEM-EDS, XRD, and XPS to confirm its structure and active site distribution. Dehydration of glucose was performed in a biphasic water/methylisobutylketone (H_2O : MIBK 1:4) medium, which simultaneously enabled in situ extraction of HMF and suppressed humins formation. Key parameters, including temperature (170-190°C), reaction time (10-14 h), and catalyst loadings (25-75%), were systematically optimized by Box-Behnken Design. The synergistic interaction between Si, Al and Fe generated a higher density of Lewis and Bronsted acid sites, which promoted glucose isomerization to fructose and enhanced HMF selectivity. Under optimized conditions, a maximum HMF yield of 63.91% and glucose conversion of 99.22% were achieved at 180°C, 50% catalyst loading after 14h, with significant suppression of by-products. Catalyst was reused up to four cycles and regenerated. Overall, this study demonstrates the potential of integrating metallic catalysis with biphasic processing as a large, scalable and sustainable strategy for producing HMF from glucose.



Presenter: Nkolika Omoni

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Sustainable Bioproducts

Advisor: Dr. F. Nistal-França, Professor, Sustainable Bioproducts

Title: Effects of Wildfire on Wood Properties of Surviving Ponderosa Pine in Plumas National Forest

Abstract: Wildfires are increasing in frequency and severity across western U.S. forests, affecting tree survival and wood quality. Ponderosa pine (*Pinus ponderosa* Dougl.) is adapted to frequent, low-intensity fire. Its thick bark and fire tolerance allow mature trees to survive wildfire; however, survival does not mean the tree is unaffected. Fire may cause scars, bark scorch, crown damage, and changes in wood properties. These impacts can occur within the stem and may alter density, stiffness, and strength.

Despite increasing interest in fire's impact on forest structure, the effects of wildfires on wood properties of surviving ponderosa pine remain poorly understood. This study addresses that gap by examining how wildfire frequency affects wood density, modulus of elasticity (MOE), and modulus of rupture (MOR) in surviving ponderosa pine trees. Eighteen trees were sampled from the Plumas National Forest, with three fire-treatment classes: six trees from an unburned control plot, six from a one-burn plot, and six from a two-burn plot. Small, clear specimens were prepared from each tree for density and mechanical testing following ASTM standards.

Preliminary results indicate that wildfire history affects wood properties. Density differed significantly between the two-burn and one-burn treatments but did not differ between the two-burn and control trees. Mechanical properties showed stronger fire-related impacts, with MOE and MOR displaying greater variability in burned trees, especially those exposed to multiple fires. Control trees exhibited more uniform radial trends, while burned trees had inconsistent profiles, suggesting heightened structural variability following fire. The study shows that surviving ponderosa pine trees experience measurable internal changes in wood quality after wildfire, particularly when exposed to repeated burns. These findings underscore the importance of considering fire history when assessing wood quality in fire-affected forests and highlight the need to account for radial variation in future evaluations of fire-surviving trees.



Presenter: Nkolika Omoni

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Sustainable Bioproducts

Advisor: Dr. F. Nistal-França, Professor, Sustainable Bioproducts

Co-Advisor: Dr. Frederico Franca, Professor, Sustainable Bioproducts

Title: Effects of Wildfire on Wood Properties of Surviving Ponderosa Pine in Plumas National Forest

Abstract: Wildfires are increasing in frequency and severity across western U.S. forests, affecting tree survival and wood quality. Ponderosa pine (*Pinus ponderosa* Dougl.) is adapted to frequent, low-intensity fire; its thick bark allows many mature trees to survive. However, survival does not mean trees are unaffected. Fire can cause scars, bark scorch, crown damage, and internal changes that may alter wood density, stiffness, and strength.

This study examines how wildfire frequency affects wood density, modulus of elasticity (MOE), and modulus of rupture (MOR) in surviving ponderosa pine. We sampled 18 trees from Plumas National Forest across three fire-history treatments: unburned control, one-burn, and two-burn plots, with six trees per treatment. Small, clear specimens were prepared from each tree for density and mechanical testing following ASTM standards.

Preliminary results indicate that wildfire history influences wood properties. Density differed significantly between one-burn and two-burn trees but did not differ between two-burn and control trees. Mechanical properties showed stronger fire-related effects: MOE and MOR were more variable in burned trees, particularly those exposed to repeated fires. Control trees showed more uniform radial trends, whereas burned trees had inconsistent profiles, suggesting greater structural variability after fire. These findings emphasize the need to consider fire history and radial variation when evaluating wood quality in fire-affected forests.



Presenter: Olalekan Olabode

Presentation Type and Session: Poster, P1

Level of Study: PhD

Department: Chemistry

Advisor: Dr. Todd Mlsna, Professor, Chemistry

Title: Fabrication of Redox Active Mn₃O₄ on Douglas Fir Biochar for Aqueous Arsenic(III) Oxidation and Remediation

Abstract: Aqueous As(III) is more toxic than As(V). Its remediation from wastewater is challenging due to its neutral charge at neutral water pH. Hausmannite (Mn₃O₄) is the most stable Mn-oxide in geological settings. However, Mn₃O₄ supported on biochar or any carbon matrix remains unexplored for As(III) redox remediation. In this study, Mn₃O₄-modified Douglas fir biochar (Mn₃O₄@DFBC), designed to adsorb and oxidize As(III) to As(V), was prepared by NaOH-induced precipitation, followed by passive air oxidation. Batch adsorption studies at As(III) concentrations of 100 µg/L to 250 mg/L revealed maximum uptake at pH 5-7. The adsorption equilibrium data fitted the Langmuir isotherm best, with a maximum monolayer adsorption capacity of 13.0 mg/g at 25°C. Only negligible As uptake occurred on pristine DFBC. The effects of Mn₃O₄@DFBC dose, ionic strength, and lake water matrices on As(III) removal were studied. Regeneration experiment restored ~76% of the As(III) removal capacity after three cycles. XPS analysis revealed 65.5% of the adsorbed As(III) was oxidized to As(V), accompanied by Mn(III) reduction to Mn(II). A new As-O XPS peak confirmed the formation of chemisorbed Mn-O-As complexes. In the near-neutral water pH range, As(V) could form monodentate-mononuclear (1V), bidentate-binuclear (2C) and bidentate-mononuclear (2E) Mn-O-As chemisorbed complexes.



Presenter: Olawale Ajisafe

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Comparative Biomedical Science

Advisor: Dr. Janice Chambers, Professor, Biomedical Sciences

Title: Evaluating CYP450 and Transporter-Mediated Drug Interaction Potential of Novel Oxime 20

Abstract: Abstract

Organophosphate (OP) anticholinesterase poisoning remains a global health concern, necessitating safer and more effective antidotes. Oxime 20 is a novel acetylcholinesterase reactivator with potential for improved efficacy in OP poisoning treatment. Given polypharmacy in OP management, this study evaluated the drug-drug interaction (DDI) potential of Oxime 20 against select cytochrome P450 enzymes (CYPs) and organic cation transporter 2 (OCT2). CYP1A2, CYP2B6, and CYP3A4 inhibition was assessed using the luminogenic P450-Glo assay (Promega) following Oxime 20 exposure (1–500 μ M), with selective inhibitors as positive controls. CYP3A4-mediated testosterone 6 β -hydroxylation was quantified in induced liver microsomes using UPLC-MS. OCT2 interactions were assessed in OCT2-overexpressing Madin-Darby Canine Kidney (MDCK) cells by measuring Oxime 20 intracellular accumulation and inhibition of OCT2-mediated ASP⁺ uptake. Oxime 20 minimally inhibited CYP1A2 and CYP3A4 below 100 μ M, with inhibition above 200 μ M, while CYP2B6 showed greater inhibition. Testosterone 6 β -hydroxylation was not significantly affected. Oxime 20 inhibited OCT2-mediated ASP⁺ uptake only at higher concentrations and showed no enhanced intracellular accumulation, suggesting it is unlikely an OCT2 substrate. Overall, Oxime 20 has low potential for clinically relevant CYP1A2-, CYP3A4-, and OCT2-mediated DDIs, supporting its continued development as a promising therapeutic for OP poisoning. (Supported by NIH U01 NS123255.)



Presenter: Oluwadamilare E. Oloyede

Presentation Type and Session: Flashtalk, F1

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr. Madhav Dhakal, Assistant Research Professor, Plant and Soil Sciences

Title: Tailwater recirculation reduces methane emissions in irrigated rice production systems

Abstract: Rice production with flood irrigation from the five-leaf stage to two weeks preharvest consumes a substantial amount of water and significantly contributes to atmospheric methane (CH₄) concentration due to the anaerobic conditions it creates. Irrigation management practices that discontinue flooding can reduce CH₄ emissions from rice production and make it more eco-friendly. A multi-year, multi-location study was conducted in farmers' fields in the Mississippi Delta to (i) evaluate irrigation strategies – continuous flooding and recirculating row rice (furrow irrigation with tailwater recirculation) - in methane emissions. Methane flux was measured using open-path (wavelength modulation spectroscopy, LICOR Inc.) gas analyzers in eddy covariance systems. Growth and developmental data were collected bi-weekly, and yield data were collected at physiological maturity. The results showed that the cumulative CH₄ flux over the season was more than 25% less than in continuously flooded rice. The results indicate that tailwater recirculation can mitigate methane emissions from row rice production.



Presenter: Pankaj Prashad Joshi

Presentation Type and Session: Flashtalk, F1

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr. M Dhakal, Assistant Professor, Plant and Soil Sciences

Title: Regenerative Practices Mitigate Greenhouse Gas Emissions in Corn Production

Abstract: Intensive tillage in corn deteriorates soil structure and depletes soil organic carbon. Tillage significantly contributes to atmospheric greenhouse gas (GHG) concentrations, especially nitrous oxide (N₂O). Management practices that enhance SOC sequestration and reduce nutrient loss may mitigate GHG production. A field experiment was initiated in 2024 to investigate the effects of tillage (no tillage (NT) and conventional tillage (CT)) and cover crops (CC) (winter wheat, Austrian winter pea, and no cover crop) on seasonal N₂O, methane (CH₄), and carbon dioxide (CO₂), CO₂ equivalent (CO₂e) emissions, yield-scaled emissions (YSE), and corn yield. Weekly measurements of soil N₂O, CO₂, and CH₄ fluxes were taken using LICOR trace gas analyzers and smart flux chambers. Cumulative N₂O emissions were reduced by 49% and 47% in wheat and without CC, respectively, compared to pea. Combined analysis across years showed that CT-wheat and NT with no cover crop (NT-NCC) reduced seasonal N₂O emissions by 53% and 68% compared to CT-pea. Seasonal N₂O emissions were 61% lower in NT-NCC than CT-NCC. Further, NT-NCC and CT-wheat reduced cumulative CH₄ emissions by 68% and 53%, respectively, compared to CT-pea. CO₂e, YSE, and yield were comparable across treatments. Overall, regenerative management practices reduce GHG without a corn yield penalty.



Presenter: Pankaj Prashad Joshi

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr. M Dhakal, Assistant Professor, Plant and Soil Sciences

Title: Evaluating Protected Nitrogen Application Practices in Mitigating Greenhouse Gas Emissions

Abstract: Corn relies heavily on nitrogen (N) fertilizers, which is a major driver of nitrous oxide (N₂O) emissions. Management practices that enhance the nitrogen recovery in plant tissues and reduce nitrification-denitrification losses can minimize emissions. Field experiments were initiated in May 2024 to evaluate two N application levels (Low: 246 kg N ha⁻¹ and High: 297kg N ha⁻¹ as Urea and Urea Ammonium Nitrate), N-stabilizer (No-stabilizer and 0.75 g ai N-(n-butyl)-thiophosphoric triamide (NBPT) kg⁻¹ Urea), placement depths (0 and 10 cm), and post-fertilization management (closing trench with packer wheel and leaving open) on total seasonal carbon-dioxide equivalent (CO₂e) emission, yield, and yield-scaled emission (YSE) in corn (*Zea mays*). Weekly measurements of soil CH₄, N₂O, and CO₂ fluxes were taken using trace gas analyzers and static flux chambers. Cumulative-YSE was similar across treatments; however, CO₂e emissions were 9% greater for the High N rate treatment than the Low. Inhibitor showed varied N₂O responses within the years, with no effect, greater and reduced emission by half in first, second and third year, respectively. Although treatment effects were evident in individual years, they were inconsistent across years. Overall, practices that improve N use can reduce N₂O emissions, given that seasonal variability may occur.



Presenter: Prachi Pannu

Presentation Type and Session: Flashtalk, F5

Level of Study: Master's

Department: Agricultural and Biological Engineering

Advisor: Dr. Steven H. Elder, Agricultural and Biological Engineering

Title: Development of Kartogenin-Loaded Electrospun PCL-PLGA Scaffolds for enhanced Microfracture Repair

Abstract: Articular cartilage defects remain a significant clinical challenge because cartilage possesses limited intrinsic regenerative capacity. Microfracture is a commonly performed cartilage repair procedure that recruits bone marrow-derived mesenchymal stem cells (MSCs) to the defect site; however, the resulting repair tissue is predominantly fibrocartilage, which lacks the composition and mechanical properties of native hyaline cartilage. Thus, there is a need for strategies that improve the quality and durability of cartilage repair. Kartogenin (KGN) has emerged as a promising candidate for cartilage regeneration as it selectively stimulates chondrogenic differentiation of MSCs. Our long-term objective is to develop a bioactive electrospun scaffold capable of delivering chondrogenic and chemotactic signals within a cartilage defect while supporting endogenous cell recruitment. Electrospun PCL/PLGA scaffolds have previously demonstrated sustained delivery of KGN; however, scaffold architecture and surface characteristics remain important considerations because they influence accessibility to the scaffold interior and opportunities for bioactive functionalization. The purpose of this study was to investigate techniques to increase scaffold pore size and enhance its surface properties. Pore size was addressed through polymer concentration, solvent mixture, and solution flow rate during electrospinning. Polydopamine (pDA) coating was incorporated as a surface modification strategy to enhance scaffold hydrophilicity and provide reactive functional groups for future growth factor immobilization. Scaffolds were characterized in terms of fiber size (indirect indicator of pore size), tensile modulus and strength, wettability, and kinetics of KGN release. Ongoing studies are focused on PDGF-BB functionalization and incorporation of sacrificial PEO fibers to generate macroporous scaffolds with enhanced cellular infiltration capacity.



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Articular cartilage defects remain a significant clinical challenge because cartilage possesses limited intrinsic regenerative capacity. Microfracture is a commonly performed cartilage repair procedure that recruits bone marrow-derived mesenchymal stem cells (MSCs) to the defect site; however, the resulting repair tissue is predominantly fibrocartilage, which lacks the composition and mechanical properties of native hyaline cartilage. Thus, there is a need for strategies that improve the quality and durability of cartilage repair. Kartogenin (KGN) has emerged as a promising candidate for cartilage regeneration as it selectively stimulates chondrogenic differentiation of MSCs. Our long-term objective is to develop a bioactive electrospun scaffold capable of delivering chondrogenic and chemotactic signals within a cartilage defect while supporting endogenous cell recruitment. Electrospun PCL/PLGA scaffolds have previously demonstrated sustained delivery of KGN; however, scaffold architecture and surface characteristics remain important considerations because they influence accessibility to the scaffold interior and opportunities for bioactive functionalization. The purpose of this study was to investigate techniques to increase scaffold pore size and enhance its surface properties. Pore size was addressed through polymer concentration, solvent mixture, and solution flow rate during electrospinning. Polydopamine (pDA) coating was incorporated as a surface modification strategy to enhance scaffold hydrophilicity and provide reactive functional groups for future growth factor immobilization. Scaffolds were characterized in terms of fiber size (indirect indicator of pore size), tensile modulus and strength, wettability, and kinetics of KGN release. Ongoing studies are focused on PDGF-BB functionalization and incorporation of sacrificial PEO fibers to generate macroporous scaffolds with enhanced cellular infiltration capacity.



Presenter: Prathiksha Raghava

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr. Prakash Kumar Jha, Assistant Professor, Plant and Soil Sciences

Title: Evaluating Groundwater Sustainability Under Agricultural Water Use in the Mississippi Delta

Abstract: Groundwater is a major source of irrigation in the Mississippi Delta, where intensive agricultural withdrawals have contributed to declining groundwater levels and concerns about long-term aquifer sustainability. Spatial information on aquifer properties, land-surface elevation, hydrologic boundaries, irrigation wells, and pumping rates is incorporated into the model. Crop water requirements and irrigation demand are used to represent groundwater withdrawals, with the framework designed to support integration with DSSAT for crop-specific irrigation estimation. Simulated groundwater heads are compared with available observed groundwater-level data to evaluate model performance. Changes in groundwater storage, hydraulic head, and spatial patterns of drawdown are analyzed to identify areas experiencing greater groundwater stress. This study develops a groundwater-flow model using the U.S. Geological Survey's MODFLOW framework to evaluate groundwater dynamics under agricultural pumping conditions. The modeling framework provides a basis for assessing the influence of agricultural irrigation on aquifer conditions and can be used to evaluate alternative pumping and water-management scenarios. The study supports improved understanding and sustainable management of groundwater resources in the Mississippi Delta.



Presenter: Priyanka Paudel

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Computer Science

Advisor: Jingdao Chen (Associate Professor in Department of CS,)

Co-Advisor: Jingdao Chen Department of CS

Title: Visual Question Answering

Abstract: Multimodal large language models are increasingly evaluated for spatial reasoning from egocentric video, yet it remains unclear whether they can maintain a consistent spatial representation as the observer moves through an environment. This work studies dynamic observer-centric spatial reasoning, where changes in the observer's position and orientation require previously established spatial relations to be updated over time. We focus on whether models can jointly track observer-to-object and object-to-object relationships while preserving relations that should remain unchanged and correctly updating those affected by motion. Using controlled egocentric trajectories with known scene geometry, we evaluate models through linked spatial queries across multiple time steps and reference frames. Beyond individual question accuracy, we measure temporal and relational consistency, including reciprocal and transitive spatial constraints. The study aims to reveal whether current multimodal models maintain a coherent evolving spatial world model or instead answer successive spatial questions independently.



Presenter: Rachel Marie Bobo

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Plant and Soil Sciences

Advisor: Dr. Richard L. Harkess, Professor, Plant and Soil Sciences

Title: Gibberellin biosynthesis inhibitor Ancymidol restricts growth of *Streptocarpus* hybrids

Abstract: *Streptocarpus x hybridus* is a small flowering gesneriad with potential in the houseplant industry. Plant form and flowering of *Streptocarpus x hybridus* Ladyslippers® ‘Grape Ice’ and

‘Deep Blue Vein’ were examined in response to exogenous application of two growth retardants Ancymidol and Chlormequat Chloride (CCC). *Streptocarpus* is a gesneriad with atypical growth from a groove meristem, with elongated leaves that grow continually under favorable conditions. Endogenous hormones of gibberellin (GA3) and cytokinins interact to regulate growth and the establishment of floral buds. Ancymidol and CCC disrupt GA3 biosynthesis but efficacy and effect depend on application rate, time of treatment, and species sensitivity. *Streptocarpus* hybrids were treated with CCC at 0, 1000, 1500, 2000, and 2500 mg L⁻¹ or ancymidol at 0, 50, 100, 150, or 200 mg L⁻¹ with two application schedules: 2 weeks post-transplant (WPT) or 2 and 3 WPT. CCC did not significantly affect the plant growth of either *Streptocarpus* cultivar. Ancymidol effectively restricted *Streptocarpus* growth in ‘Grape Ice’ and partially in ‘Deep Blue Vein.’ Multiple treatments do not increase the effect of ancymidol; 200 mg L⁻¹ applied 2 WPT restricted final plant size of both cultivars by 20% with minimal impacts on flowering time and number.



Presenter: Ramak Nassiri

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Computer science and Engineering

Advisor: Dr. Charan Gudla, Assistant Professor. Computer science and Engineering

Title: Attacking Tabular Foundation Models

Abstract: Tabular foundation models condition predictions on labeled examples supplied at inference time, creating an attack surface that differs from conventional model training. We study four manipulation families—label flipping, backdoor context poisoning, clean-label context selection, and test-time evasion—and organize them by attack stage, label consistency, and distributional realism. TabPFN-2.5, TabICL, and XGBoost are evaluated on CIC-IDS2017 and N-Balot using a common preprocessing and evaluation pipeline. Backdoor context poisoning provides strong targeted control over the in-context models with little change in clean accuracy, whereas selecting real, correctly labeled boundary-crowding rows causes no systematic accuracy degradation up to a 20% bias fraction. A simplified surrogate-transfer constrained PGD attack inspired by, but not equivalent to, CAPGD also produces test-time evasion, outperforming equal-budget random noise in most settings. The comparison shows that attack effectiveness depends strongly on both where manipulation occurs and how much freedom the attacker has to alter the data.



Presenter: Rodgers Kabenomuhangi

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Department of Agricultural and Biological Engineering

Advisor: Dr. Sayantan Samanta, Assistant Professor, Agricultural and Biological Engineering

Title: Simulating the Impacts of Regenerative Agriculture on Runoff and Infiltration in the Big Sunflower River Watershed

Abstract: Conventional tillage increases runoff and reduces infiltration through repeated soil disturbance that degrades soil structure. In contrast, regenerative practices such as no-tillage and cover crops improve organic carbon and soil water retention in the root zone, and limit sediment and nutrient losses. While the field-scale benefits of these practices are well documented, their cumulative impacts at the watershed scale remain largely unknown. The overall goal of this study is to quantify how widespread adoption of regenerative agriculture affects water quantity and to understand the associated hydrological processes. A baseline Soil and Water Assessment Tool Plus (SWAT+) model representing conventional tillage was developed for the Big Sunflower River Watershed in the Mississippi Delta. About 70% of the watershed is cropland, dominated by corn, soybean, rice, and cotton production on predominantly clay-rich soils. The SWAT+ model will be evaluated for streamflow and county-level yields. Preliminary model evaluation produced streamflow NSE ranging between 0.18 and 0.57 across three locations. Efforts are underway to improve the model performance and build scenarios to represent no-tillage and cover crops. Results from this study will be helpful for watershed managers, conservationists, and policy makers in promoting the environmental benefits of regenerative practices.



Presenter: Sadie Studdard

Presentation Type and Session: Poster, P2

Level of Study: Master's

Department: Department of Biochemistry, Nutrition, and Health Promotion

Advisor: Dr. Rahel Mathews PhD, MPH, RDN: Professor, Department of Biochemistry, Nutrition, and Health Promotion

Title: Providing Universal School Meals Can Reduce Food Insecurity: A Policy Review of the Community Eligibility Provision in Mississippi

Abstract: Mississippi has one of the nation's highest rates of child food insecurity. The Community Eligibility Provision (CEP) allows eligible schools to provide free meals, aiming to increase participation while reducing stigma and administrative burden. This review examined CEP implementation and outcomes in Mississippi. Government reports, policy documents, nonprofit datasets, and literature (2016–2026) were reviewed from March to June 2026. Mississippi Department of Education (MDE) records from SY 2018–19 through 2025–26 were analyzed to compare districtwide eligibility and participation. Evidence allowed for regional and nationwide comparisons. Nationally, rural districts reported greater outcomes—including increased meal access and lower household food insecurity—than urban districts. CEP participation was highest in the Southern U.S. (56% of eligible schools). However, Mississippi's adoption remained lower than in surrounding states. In SY 2024–25, MDE data showed implementation declined: only 52 of 150 (35%) Mississippi districts with a CEP-eligible school adopted the program. Additionally, among 106 fully eligible districts, MDE reported 66 (62%) participated districtwide, down from 95% in SY 2023–24. CEP may reduce food insecurity in Mississippi, particularly in rural communities, but state participation rates remain low. Evaluating financial and operational implementation characteristics could help maximize the program's statewide benefits.



Presenter: Sam Freville, M.S.

Presentation Type and Session: Poster, P4

Level of Study: PhD

Department: Psychology

Advisor: Dr. Samuel Murphy, Assistant Professor, Department of Psychology

Title: Credibility as a mood-dependent belief: Depression, anxiety, and stress as moderators of the impact

Abstract: CBT skills have shown to be effective in reducing internalizing symptoms, but questions remain about how affective state influences skill acquisition. This study implemented a modular analogue experimental design, evaluating the impact of a sad mood induction procedure on perceived credibility of CBT skills. In this study, 201 participants were randomized to a sad mood induction condition or a non-induction naturalistic control condition. Participants were subsequently randomized to a cognitive restructuring or positive thinking skills worksheet-based training, after which skill credibility was assessed. Results indicated no main effect of mood induction or assigned skill nor an interaction effect on credibility. CBT skills moderated the impact of intervention condition on credibility $F(1, 193) = 5.80, p = .017, \eta p^2 = .029$ with those in the sad mood induction showing a stronger relationship. Symptoms of depression, anxiety, and stress independently moderated the relationship between the procedure condition and intervention credibility ($p = .006 - .020$), with symptom severity negatively associated with intervention credibility in the naturalistic mood condition which was reversed in the sad mood induction. These findings indicate sad mood induction procedures can be utilized to increase credibility of CBT skills when fostering these skills among individuals with elevated internalizing symptoms.



Presenter: Samadhi Nisansala Nawalage

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Sustainable Bioproducts

Advisor: Dr. J. Zhang, Professor, Sustainable Bioproducts

Title: Effects of Steam Activation on the Structure and Performance of Pine Sawdust Derived Biochar Supported Graphene Shelled ZeroValent Iron Nanoparticles

Abstract: Heavy metal (HM) contamination of waterways poses serious public health and environmental challenges for agricultural and rural communities. Biochar (BC), a carbonaceous adsorbent derived from waste biomass, when combined with nanoscale zerovalent iron (nZVI), forms a highly reactive, low cost, sustainable material capable of removing HMs through multiple mechanisms. However, only a few studies have examined how BC pore structure, surface area, and iron loading influence nZVI particle size, iron utilization efficiency, and HM removal performance. This study investigated how steam activation of BC influences the formation and performance of BC supported graphene shelled zero valent iron composites. BC was produced from pine sawdust at three pyrolysis temperatures and evaluated with and without steam activation at three activation temperatures. The materials were then impregnated with iron and carbothermally reduced, producing twelve distinct composites. The composites were characterized and tested for HM removal through batch adsorption studies. Steam activation increased BC surface area (from as low as $2.4 \text{ m}^2/\text{g}$ to about $900 \text{ m}^2/\text{g}$), but this did not consistently improve iron utilization of the composite. Overall, the performance of the composites was found to depend on the combined effects of pyrolysis temperature and steam activation.



Presenter: Samar Ghanam

Presentation Type and Session: Flashtalk, F2

Level of Study: PhD

Department: Physics and Astronomy

Advisor: Prof. Gautam Rupak, Professor, Physics Department

Title: Compact Fermion to Qubit Encoding for Quantum Simulation

Abstract: Quantum simulation of fermionic systems requires mapping fermionic degrees of freedom onto qubits while preserving the correct anticommutation relations. Standard mappings such as the Jordan Wigner transformation are straightforward but can introduce long nonlocal Pauli strings, increasing the complexity of quantum circuits. In this work, we study a compact fermion to qubit encoding designed to improve locality by introducing auxiliary qubits together with stabilizer constraints. We construct the encoding explicitly on small two-dimensional lattices and examine how physical fermionic occupation states are embedded into the enlarged qubit Hilbert space. The auxiliary qubit states are determined by the fermionic configuration and enforce the stabilizer conditions that define the physical subspace. This provides an explicit representation of the encoding map and clarifies the role of auxiliary degrees of freedom during quantum evolution. Understanding this structure is an important step toward implementing compact encodings in quantum algorithms for lattice and nuclear-physics simulations, where reducing operator nonlocality and circuit complexity is essential for practical quantum computation.



Presenter: Samjhana Panthi

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Department of Forestry

Advisor: Dr. Robert Grala, Department of Forestry

Title: Drivers of forest management expenditures among non-industrial private forest (NIPF) landowners in Mississippi

Abstract: Timber production remains the central focus of forest management in Mississippi. Given that the majority of forestland in Mississippi is owned by non-industrial private forest (NIPF) landowners, their management decisions and expenditures strongly influence the economic viability of timber production. However, it is unclear how socioeconomic and biophysical factors affect the expenditures landowners incur on forests in Mississippi, which may increase the likelihood of forestland conversion to other land uses. A log-linear model was used to model the forest management expenditures as a function of the landowner's demographic characteristics, landowner's objectives, and property characteristics. Forest management expenditures data were collected from mail surveys of 2000 randomly selected NIPF landowners each year during 2018-2022 in Mississippi. Education is hypothesized to be positively related to management expenditures because more educated landowners are generally better informed about the economic and environmental benefits of active forest management. Income is expected to be positively associated with management expenditures, as higher income increases the likelihood of engaging in active forest management and timber production activities. Whereas the distance to the nearest forest is expected to be negatively associated with management expenditures as landowners who reside farther from the market are less likely to engage in management activities. The results provide insights into how various factors shape trends in forest management expenditures and will help develop more effective timberland management strategies.

Keywords: Factors, management expenditures, NIPF landowners, timber production.



Presenter: Sandesh Gauli

Presentation Type and Session: Poster, P2

Level of Study: Master's

Department: Agricultural Science and Plant Protection

Advisor: Dr. M. Munir, Assistant Professor, Department of Agricultural Science and Plant Protection

Title: The Path to Improved Disease Management: Understanding Fusarium Storage Rot in Mississippi Sweetpotato

Abstract: Sweetpotato (*Ipomoea batatas* [L.] Lam.) is an economically important crop in Mississippi, where postharvest diseases can substantially reduce storage-root quality and marketability. In a survey conducted across MS, *Fusarium* spp. identified as the most frequently recovered fungal pathogens from postharvest-diseased sweetpotato, yet their diversity, pathogenicity, and fungicide sensitivity remain unexplored. This study characterized the species diversity, colonization potential, and fungicide sensitivity of *Fusarium* isolates associated with postharvest diseases of sweetpotato in Mississippi. Isolates identified as *Fusarium* by colony morphology were further identified by sequencing the internal transcribed spacer (ITS) region. Sequences were compared with reference databases from the National Center for Biotechnology Information and FUSARIOID-ID, and phylogenetic analyses were conducted. Six species were identified: *F. bataticola*, *F. equiseti*, *F. incarnatum*, *F. oxysporum*, *F. solani*, and *F. verticillioides*. *Fusarium oxysporum* was the most prevalent (53%), followed by *F. solani* (20%). Colonization assays on 'Beauregard' sweetpotato showed variation in colonization potential among species, and preliminary fungicide sensitivity assays likewise revealed differences in fungicide response. These results provide baseline information to support more effective, locally relevant strategies for managing *Fusarium*-associated postharvest diseases of sweetpotato in MS.



Presenter: Santee Ezell

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: School of Human Sciences

Advisor: Dr. Lori Elmore-Staton, Professor, Human Development & Family Science

Title: From High School to Higher Education: Family Engagement Among Rural Mississippi Families

Abstract: Family engagement remains an important influence on students' educational experiences, yet less is known about how families understand and navigate the transition from high school to higher education, particularly in rural communities. This dissertation study examines family engagement among parents and caregivers of high school and college students in rural Mississippi, with attention to their knowledge, perceptions, confidence, and support needs during the college-going transition.

Guided by Family Development Theory and perspectives on emerging adulthood, the study explores how family engagement may differ depending on whether a student is preparing to enter college or is currently enrolled. Using a quantitative survey design, parents and caregivers of high school juniors and seniors and current college students will report on college knowledge, college-going culture, family engagement confidence, students' management of increasing responsibilities, and social supports.

Findings from this study are expected to strengthen understanding of how rural families experience the transition to higher education and identify opportunities for schools, colleges, and community organizations to better engage and support families throughout the college-going process. The study may inform family-centered strategies designed to improve college readiness, transition support, and postsecondary success in rural communities.



Presenter: Santosh Rajbanshi

Presentation Type and Session: Flashtalk, F1

Level of Study: PhD

Department: Geosciences

Advisor: Dr. Varun Paul

Title: Compartmentalization of Rare Earth Elements in Soil-Plant-Water Systems

Abstract: Understanding the distribution of rare earth elements (REEs) across soil–plant–water compartments is essential for assessing their environmental fate. This greenhouse study investigated five REEs (La, Ce, Nd, Gd, and Dy) in fly-ash-amended soil cultivated with four plant species under six fly ash–biochar treatments. Elemental concentrations in soil, roots, shoots, and leachate were evaluated using bioaccumulation and translocation indices, principal component analysis, and upper continental crust normalization. REEs exhibited strong positive associations across soil and plant compartments, with greater retention in roots than translocation to shoots. However, the relationship between the normalized fractionation ratios (Gd_N/Ce_N) and (Dy_N/La_N) progressively weakened from soil ($\rho=0.858$) to roots ($\rho=0.594$) and shoots ($\rho=0.466$), suggesting additional fractionation during plant uptake and translocation. These findings highlight the importance of compartment-specific assessment for understanding REE behavior in soil–plant–water systems.



Presenter: Sashank Khaniya

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Department of Forestry

Advisor: Dr. Krishna P. Poudel, Associate Professor, Department of Forestry

Title: How crowded can U.S. Mixed Forests get? Exploring the Drivers of the Maximum Size–Density Relationship

Abstract: As climate change intensifies, some forests are losing productivity through climatic stress whereas others are increasing their productivity. Theoretically, the upper limit of forest stand productivity can be quantified through maximum size-density relationships, which indicates when competition-based mortality will initiate. Approaches for quantifying self-thinning in monocultures date to the 1930s, while approaches have only recently been developed for mixed species stands. Studies using functional traits such as specific gravity, shade tolerance, and drought tolerance to predict maximum size-density relationships have been limited to isolated regional estimates in the United States and studies that cover a wide latitudinal and climatic gradient are limited. Moreover, recent research advocates the need to understand mixed forest stand dynamics considering the effect of climate change and evolving silvicultural objectives. Hence, exploring maximum size-density relationships for mixed forests becomes important. Using quantile modeling approach to analyze data from national forest inventory plots I will present how species-specific functional traits, and environmental factors interact to impact maximum size-density relationships in United States. Findings from this research will provide empirical evidence for developing density management diagram, which is one of the important tools for making decisions regarding stocking maintenance and thinning in forest stands.



Presenter: Sharon Samuel

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: Pathobiology and Population Medicine

Advisor: Dr. David Smith, Professor and Associate Dean of Graduate and Research Studies, Pathobiology and Population Medicine

Co-Advisor: Dr. Kimberly Woodruff, Assistant Clinical Professor, Pathobiology and Population Medicine

Title: Why biosecurity breaks down: a systems view of HPAI prevention in commercial egg farms

Abstract: Commercial table-egg farms are vulnerable to highly pathogenic avian influenza (HPAI), and preventing farm and barn entry depends on consistent worker implementation of biosecurity practices. However, behavioral influences on biosecurity compliance remain understudied in U.S. commercial layer systems, and risk factors are often examined in isolation. This study identified feedback interactions between worker behavior and biosecurity bypass within a commercial table-egg farm.

Published evidence and current system understanding were used to identify behavioral factors contributing to biosecurity bypass. A causal loop diagram (CLD) was developed in Vensim® DSS.

The model identified prevention pathway indicating that worker-tailored biosecurity guidance may improve comprehension, reduce execution difficulty, support routine practices such as vegetation management, reduce wildlife and pest presence, strengthen self-efficacy, and reduce anxiety-associated protocol bypass. In contrast, outbreak-associated workload and time pressure may reduce willingness to learn and attention to procedures, increase apathy and execution difficulty, and increase protocol bypass.

The model suggests that practical, tailored support before outbreaks may strengthen biosecurity implementation, whereas outbreak-phase materials should be simplified to account for workload-related constraints. The CLD provides a framework for future expert elicitation and targeted HPAI prevention strategies in commercial table-egg systems.



Presenter: Sharon Samuel

Presentation Type and Session: Poster, P3

Level of Study: PhD

Department: Pathobiology and Population Medicine

Advisor: Dr. David Smith, Associate Professor and Dean of Graduate and Research Studies, Pathobiology and Population Medicine

Co-Advisor: Dr. Kimberly Woodruff, Assistant Clinical Professor, Pathobiology and Population Medicine

Title: A systems approach to understanding behavioral drivers of highly pathogenic avian influenza (HPAI) introduction in U.S commercial table-egg farms.

Abstract: The highly pathogenic avian influenza (HPAI) is the most devastating animal disease event in U.S. history, with egg-laying hens and pullets accounting for about 75% to 77% of total domestic losses since early 2022. With a high risk of continuous mutations and zoonotic spillover to man, a systems modeling of the multiple entry pathways into commercial poultry systems remains limited. The study developed a causal loop diagram (CLD) to identify behavioral factors that shape biosecurity bypass and HPAI risk in U.S commercial table-egg layer operations.

A comprehensive literature review was conducted and a CLD developed to map feedback mechanisms between worker biosecurity bypass and HPAI introduction into a poultry farm. Vensim® DSS for academic research was used to build the model.

The CLD identified balancing and reinforcing feedback processes linking HPAI threat salience, perceived self-efficacy, outbreak workload, communication and protocol bypass. These loops linked psychological distance from past and future outbreaks, anxiety, perceived self-efficacy for outbreak prevention, worker apathy, and outbreak response to protocol bypass. Delays were also identified between training request and education delivery, and between HPAI introduction and outbreak event.

The current model suggests that biosecurity bypass is shaped by interacting behavioral feedback over time.



Presenter: Shreeya Adhikari

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Department of Agricultural Science and Plant Protection

Advisor: Dr. Andie C. Miller, Assistant Professor, Agricultural Science and Plant Protection

Title: Flight Capacity and Migration Potential of the Soybean Looper in Mississippi Cropping Systems

Abstract: Soybean looper (SBL), *Chrysodeixis includens*, is one of the important late-season pests of soybean in Mississippi. SBL infestations can increase rapidly and vary considerably among fields and years, making timely management difficult. Migration is thought to contribute to these changes in population pressure, but the factors that influence SBL flight and movement are poorly understood. This proposed research will investigate how larval host plant and environmental conditions influence SBL flight behavior and potential migration. The first objective will determine whether host plants affect adult flight capacity. SBL larvae will be collected from soybeans and, when available, cotton, sweet potato, and common broadleaf weeds across Mississippi. Larvae will be reared to adulthood, and adults will be evaluated using computerintegrated flight mills. Flight duration, distance, velocity, and sustained flight will be measured to determine whether the host plant experienced during larval development influences adult flight performance. Sex and genetic strain will also be considered to better understand variation among individuals. The second objective will determine how temperature and photoperiod influence SBL flight initiation, persistence, and directionality. A programmable flight simulator will be used to expose adults to controlled environmental conditions and flight initiation, duration, and orientation will be monitored under these conditions to identify environmental cues associated with migratory behavior. Finally, results from both experiments will be integrated to identify biological and environment conditions associated with greater migratory potential. This research will provide a foundation for understanding late-season SBL movement and may contribute to improved scouting, prediction of pest pressure, and more informed insecticide management in Mississippi soybean production.



Presenter: Sristi Subedi

Presentation Type and Session: Poster, P2

Level of Study: Master's

Department: Biochemistry, Nutrition and Health Promotion

Advisor: Dr. Leah Pylate, Assistant Professor, Biochemistry, Nutrition and Health Promotion

Title: Community-engaged Learning in Health Promotion

Abstract: Community engaged teaching and learning fosters an opportunity for academic learning and progress through a mutually beneficial relationship for the student and a community-based partner. In the fall 2024 and 2025 semesters, students participated in a community-engaged learning course working with approximately 45 students. In a southern town, two entities collaborated, an academic unit and a local Boys and Girls Club, to incorporate a student practice-based learning experience. Graduate students were initially trained and then went to the club to teach adolescents about nutrition through a hands-on cooking demonstration. Graduate students utilized a generalized planning model, implemented the initiative, and then evaluated their results. Graduate students participated in a pre/post test prior to the initiative and one week after their implementation of the initiative. As part of the presentation, attendees will learn about lessons learned and evaluation outcomes as part of this community-engaged learning program. A notable quote from one of the graduate students, "I learned a lot through this experience. I have not worked with kids before and this gave me insight into how a program surrounding children may run. It also, showed me the importance of preparation and developing ideas that actually fit the interest of the participants. I will use this in my future career when designing programs for children and adults."



Presenter: Subha Raut

Presentation Type and Session: Poster, P1

Level of Study: PhD

Department: Mathematics and Statistics

Advisor: Dr. Amanda Diegel, Associate Professor of Mathematics, Mathematics and Statistics

Title: Same Loss, Same Noise, Opposite Schedules: Noise Structure and Optimizer Normalization Jointly Determine Whether Learning-Rate Cooldown Helps

Abstract: The cooldown phase of a warmup-stable-decay (WSD) learning-rate schedule, now a default in large-model pretraining, lowers the final training loss in some settings and does nothing in others. We give a provable account of which case obtains, and it turns on two properties together: the structure of the gradient noise and whether the optimizer normalizes its update. On a strongly convex objective with multiplicative (gradient-proportional) noise, stochastic gradient descent contracts geometrically at a constant learning rate, so cooldown has nothing to improve. Under the same objective and noise, sign-based and normalized methods, the standard surrogates for adaptive optimizers, settle on a noise floor of order η^2 and reach the minimizer only as the learning rate is driven to zero; any additive noise then reinstates a floor for every method. The mechanism is elementary: an SGD step shrinks in proportion to the gradient and so anneals itself, whereas a normalized step keeps unit scale and cannot. We solve the signSGD stationary law on the quadratic exactly and obtain the floor constant in closed form, prove a local form of the dissociation under (L_0, L_1) -smoothness, extend the floor to normalized SGD in dimension $d > 1$ by a scale-invariance argument, and establish robustness to momentum and heavy-tailed noise. Simulation confirms every prediction, and we demonstrate the resulting noise-regime diagnostic on a real classification task with directly measured gradient noise. The mechanism explains whether cooldown helps; the interior cooldown fraction used at scale lies outside stationary landscape-and-noise geometry.



Presenter: Subham Singh

Presentation Type and Session: Poster, P1

Level of Study: PhD

Department: Mathematics and Statistics

Advisor: Dr. Amanda Diegel, Associate Professor of Mathematics, Mathematics and Statistics

Title: Relative Positions Generalize, Absolute Positions Memorize: An Implicit-Bias Account of Length Generalization in Attention.

Abstract: Transformers with relative positional encodings often extrapolate to sequences longer than those seen during training, whereas transformers with learned absolute encodings typically do not. This is a robust empirical regularity, and the explanations offered for it so far are chiefly about expressivity, that is, about whether a length-generalizing solution exists. We give an optimization explanation. On a minimal fixed-offset retrieval task that isolates positional selection, the gap is governed by the implicit bias of the trained attention head: among the many solutions that fit short sequences, which one gradient descent actually selects. We prove that rotary encodings make the attention logit a function of relative offset alone, an exact equivariance, so whatever selection rule is learned at training lengths is reproduced verbatim at every longer length. Learned absolute encodings instead leave out-of-range positions unconstrained, and the trained head pins to a fixed absolute position inside the training range. We characterize the learned rotary rule as a low-rank "carrier" kernel aligned with the target offset, and we derive the resulting graceful accuracy decay as an attention-dilution law; both predictions are confirmed across seeds and offsets. A linear-attention control shows the mechanism is specific to softmax: without normalization, training selects a min-norm interpolant that does not extrapolate. The phenomenon, the equivariance, and the carrier all transfer to a multi-layer, multi-head transformer trained on a full-sequence length-generalization task. The account connects the implicit bias of attention, implicit bias for extrapolation in recurrent models, and the learning side of the RASP-L conjecture.



Presenter: Sujan Poudel

Presentation Type and Session: Poster, P2

Level of Study: PhD

Department: Department of Plant and Soil Sciences

Advisor: Dr. Raju Bheemanahalli, Associate Professor, Plant and Soil Sciences

Title: Identification of Genomic Regions Associated with Yield Traits in Cowpea

Abstract: Cowpea (*Vigna unguiculata* L. Walp.) is a climate-resilient, multipurpose legume valued for its nutritional quality and wide adaptability. Improving seed yield remains a major breeding goal because genetic, environmental, and management factors interact in complex ways throughout the growing season. Most economically important traits in cowpea, including phenological and yield components, are quantitatively inherited and controlled by multiple genes with varying effects. Therefore, discovering genomic regions associated with these traits provides valuable targets for marker-assisted and genomic-assisted breeding, facilitating the development of high-yielding genotypes adapted to rainfed environments. In this study, we phenotyped a diverse panel of cowpeas ($n=200$) for phenological and agronomic traits, including seed yield and yield components. Genotypes showed substantial phenotypic variation across measured traits. Seed yield per plant ranged from 3.0 to 84.0 g plant⁻¹, while days to flowering and maturity ranged from 33 to 83 days after sowing (DAS) and 53 to 97 DAS, respectively. Yield components also varied considerably, with pod length ranging from 10 to 23 cm, pod weight from 3.6 to 121.7 g, and pod number from 2 to 56 per plant. We observed a significant negative correlation ($r = -0.48$, $p < 0.001$) between days to flowering and nitrogen balance index (NBI). Seed weight was highly correlated with pod weight ($r = 0.96$) and pod number ($r = 0.7$) and moderately correlated with pod length ($r = 0.37$) and days to maturity ($r = 0.37$). Further, genome-wide association studies (GWAS) revealed significant marker-trait associations for various traits on different chromosomes. Both FarmCPU and BLINK consistently identified six genomic regions, including one locus each for NBI and pod length and two loci each for days to maturity and pod number. These QTLs showed high phenotypic variance ($>10\%$). These identified QTLs are a key step toward improving economically important traits through marker-assisted selection.



Presenter: Sujita Balami

Presentation Type and Session: Flashtalk, F6

Level of Study: PhD

Department: College of Veterinary Medicine

Advisor: Dr. Matt Griffin, Research Professor, DPPM, College of Veterinary Medicine

Co-Advisor: Dr. Larry A. Hanson, Professor, DCBS, College of Veterinary Medicine

Title: PRIME-BOOST VACCINATION WITH LIVE ATTENUATED EDWARDSIELLA VACCINES CONFERS PROTECTION AGAINST EXPERIMENTAL *E. PISCICIDA* CHALLENGE IN HYBRID CATFISH

Abstract: *Edwardsiella piscicida* is a major bacterial pathogen of US catfish, especially hybrids, which comprise >95% of *E. piscicida* cases, most frequently in stocker and food-size fish. Researchers developed a similar vaccine for *E. piscicida* (Ep-LAV), based on a successful live attenuated vaccine for *Edwardsiella ictaluri* (ESC-LAV). Three Ep-LAV strains were well attenuated and conferred protection against wild type *E. piscicida*. The lead candidate was highly efficacious by oral and immersion routes but did not reach the 60% target efficacy (relative percent survival, RPS) in injection models. ESC-LAV has already proven effective in protecting fingerlings against *E. ictaluri* and provides some cross protection against *E. piscicida*. Since *E. ictaluri* primarily affects fingerlings and *E. piscicida* affects older fish, a prime-boost approach with first ESC-LAV and then ESC-LAV or Ep-LAV booster was tested in hybrid catfish. This approach conferred 69–82% protection upon challenge. Actual field protection may be even more extensive since injection bypasses natural mucosal defenses. This strategy targets each disease phase where it is most detrimental and further studies are underway to assess effectiveness against diverse *E. piscicida* strains.



Presenter: Sumaira Kutub

Presentation Type and Session: Flashtalk, F4

Level of Study: PhD

Department: Biomedical Engineering

Advisor: Dr. Seungil Kim, Assistant Professor, Ag. and Bio. Engineering

Title: Design and Fabrication of PEDOT Nanoparticle Sol-Gel System for Electroresponsive Drug Delivery

Abstract: Conductive polymeric nanoparticles based on poly(3,4-ethylenedioxythiophene) (PEDOT) were developed and incorporated into a hydroxypropyl methyl cellulose (HPMC) sol-gel to create an electrically stimulated drug delivery platform. PEDOT nanoparticles (eNPs) were synthesized via aqueous oxidative polymerization of 3,4-ethylenedioxythiophene (EDOT) in the presence of a PEGylated anionic amphiphilic copolymer (PASP-PEG-PMA), which enhances colloidal stability and provides a tunable, biocompatible interface. The eNPs were characterized using Fourier-transform infrared spectroscopy (FTIR), dynamic light scattering (DLS), and electrophoretic light scattering (ELS) to confirm their chemical structure and colloidal properties, and the resulting eNP-dispersed gel was evaluated by cyclic voltammetry to assess its electrochemical properties. The cytocompatibility of the gel was assessed in rSMC using the MTT assay with direct contact over 24 h, that provided promising results indicating that the PEDOT eNP-dispersed gel is cytocompatible and holds promise as a localized, electroresponsive drug delivery system.



Presenter: Sumaira Kutub

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Biomedical Engineering

Advisor: Dr. Seungil Kim, Assistant Professor, Agricultural and Biological Engineering

Title: Design and Fabrication of PEDOT Nanoparticle Sol-Gel System for Electroresponsive Drug Delivery

Abstract: Conductive polymeric nanoparticles based on poly(3,4-ethylenedioxythiophene) (PEDOT) were developed and incorporated into a hydroxypropyl methyl cellulose (HPMC) sol-gel to create an electrically stimulated drug delivery platform. PEDOT nanoparticles (eNPs) were synthesized via aqueous oxidative polymerization of 3,4-ethylenedioxythiophene (EDOT) in the presence of a PEGylated anionic amphiphilic copolymer (PASP-PEG-PMA), which enhances colloidal stability and provides a tunable, biocompatible interface. The eNPs were characterized using Fourier-transform infrared spectroscopy (FTIR), dynamic light scattering (DLS), and electrophoretic light scattering (ELS) to confirm their chemical structure and colloidal properties, and the resulting eNP-dispersed gel was evaluated by cyclic voltammetry to assess its electrochemical properties. The cytocompatibility of the gel was assessed in rSMC using the MTT assay with direct contact over 24 h, that provided promising results indicating that the PEDOT eNP-dispersed gel is cytocompatible and holds promise as a localized, electroresponsive drug delivery system.



Presenter: Suprabhat Paramanick

Presentation Type and Session: Flashtalk, F2

Level of Study: PhD

Department: Department of Chemistry

Advisor: Dr. Mahesh K Gangishetty

Title: Core–Shell Perovskite Fibers Integrating Dual-Color Emission, Random Lasing, and Speckle-free Imaging

Abstract: Metal-halide fibers have emerged as promising photonic materials because of their excellent luminescence, optical stability, and flexibility, making them ideal for next-generation applications such as flexible light-emitting diodes, nanogenerators, and bioimaging. Despite these advances, achieving dual emission within a single-fiber architecture remains largely unexplored. Here, we report core-shell perovskite composite fibers fabricated via coaxial electrospinning, in which luminescent CsPbX₃ (X = Br and I) and PEA₂PbBr₄ are encapsulated within a hydrophobic poly(methyl methacrylate) (PMMA) matrix. The resulting fibers exhibit uniform luminescence and can be engineered to produce either single- or dual-color emissions. Notably, dual-emissive fibers retain their optical properties after 9 days of water immersion and remain emissive under extreme environmental conditions.

Beyond their luminescence and stability, the fibrous architecture provides a strongly scattering optical medium that promotes multiple light-scattering events and optical feedback, thereby enabling random lasing under optical excitation. The green-emissive CsPbBr₃@PMMA core–shell fibers exhibit stable random lasing in air, water, and acidic aqueous conditions (pH 3), highlighting their robustness across different environments. The core-shell fibers also exhibit an exceptionally low speckle contrast of 0.008, substantially lower than that obtained with a conventional continuous-wave laser source. Collectively, these findings establish core-shell perovskite fibers as multifunctional photonic platforms.



Presenter: Suprabhat Paramanick

Presentation Type and Session: Poster, P1

Level of Study: PhD

Department: Department of Chemistry

Advisor: Dr. Mahesh K Gangishetty

Title: Core–Shell Perovskite Fibers Integrating Dual-Color Emission, Random Lasing, and Speckle-free Imaging

Abstract: Metal-halide fibers have emerged as promising photonic materials because of their excellent luminescence, optical stability, and flexibility, making them ideal for next-generation applications such as flexible light-emitting diodes, nanogenerators, and bioimaging. Despite these advances, achieving dual emission within a single-fiber architecture remains largely unexplored. Here, we report core-shell perovskite composite fibers fabricated via coaxial electrospinning, in which luminescent CsPbX₃ (X = Br and I) and PEA₂PbBr₄ are encapsulated within a hydrophobic poly(methyl methacrylate) (PMMA) matrix. The resulting fibers exhibit uniform luminescence and can be engineered to produce either single- or dual-color emissions. Notably, dual-emissive fibers retain their optical properties after 9 days of water immersion and remain emissive under extreme environmental conditions.

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Presenter: Syed Mohammed Farhan

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Computer Science & Engineering

Advisor: Dr. Charan Gudla

Title: Does Multimodal Dementia Detection Rely on Culturally-Variable Discourse Patterns? Evidence from Gating Analysis and Perturbation Testing

Abstract: Speech-based artificial intelligence for dementia detection is approaching toward clinical deployment, yet most systems are trained and validated primarily on Western English-speaking populations, with cross-cultural generalization remaining largely uncharacterized. As a prerequisite to cross-cultural validation, we investigate which discourse features a Western-trained multimodal model relies upon for classification decisions. Our findings suggest that the model's decisions are sensitive to comprehensive enumeration and linear discourse structure. Because these discourse patterns are documented to vary across cultural and linguistic communities, the results identify testable hypotheses for future cross-cultural validation rather than direct evidence of cross-cultural bias. We provide an analytical framework identifying which discourse features require validation when testing on diverse populations, offering a concrete roadmap for assessing cultural generalization risk before clinical deployment beyond Western contexts. This work establishes what must be measured in prospective cross-cultural studies to ensure equitable diagnostic performance across linguistic and cultural groups.



Presenter: Thainara Lima

Presentation Type and Session: Flashtalk, F5

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dr. Vitor Martins, Assistant Professor, Agricultural and Biological Engineering

Title: Scales of observations: the power of high-resolution sensors in mapping nearshore seaweed in the Greater Antilles

Abstract: Satellite remote sensing is a critical tool for monitoring and assessing the spatial distribution and temporal changes of seaweeds in the Atlantic Ocean. Pelagic seaweeds, such as Sargassum, support open-ocean ecosystems by providing vital habitat and driving nutrient cycling. However, massive accumulations disrupt nearshore marine life, trigger hypoxia during decomposition, and release harmful hydrogen sulfide gas. Beyond these ecological impacts, beach-fouling landings severely burden tourism-dependent Caribbean economies, making timely, accurate monitoring vital for coastal management and local livelihoods. Despite their importance, most efforts to date have relied on medium-resolution satellite sensors such as MODIS, which has a spatial resolution between 500 m and 1 km. While case studies have shown the potential of high-resolution sensors such as the European satellite Sentinel-2 MSI (10 and 20 m of spatial resolution) and NASA's Landsat-8/9 (30 m of spatial resolution), large-scale systematic mapping of floating macroalgae in nearshore waters using such sensors has been lacking due to several challenges, including the smaller extent and higher fragmentation of nearshore seaweed patches relative to sensor pixel size, persistent cloud cover and sun glint in tropical coastal regions, interference from turbid or optically complex nearshore waters, and the computational burden of processing high-resolution imagery at coastal-to-basin scales with sufficient temporal frequency. Here, we develop a practical approach to map floating algal blooms in coastal waters using harmonized Sentinel-2 and Landsat-8/9 observations, then evaluate its performance across the entire Caribbean Sea in 2025. The performance is evaluated against MODIS observations, with strengths and limitations in both datasets quantified at daily, monthly, and annual scales. This analysis also enables a more complete understanding of uncertainties in MODIS-derived seaweed observations. High-resolution satellite mapping is essential for coastal water monitoring, as nearshore seaweed dynamics unfold at spatial and temporal scales that coarse sensors cannot resolve. By capturing these fine-scale bloom structures, this work advances long-term, high-fidelity tracking across complex and diverse coastal environments.



Presenter: Trisa Das

Presentation Type and Session: Flashtalk, F1

Level of Study: Master's

Department: Agricultural Science and Plant Protection

Advisor: Dr. Te Ming Tseng, Professor, Agricultural Science and Plant Protection

Title: Are Phenolic Compounds Promising Bioherbicides for Palmer Amaranth in Soybean?

Abstract: Palmer amaranth (*Amaranthus palmeri*) is one of the most damaging weeds in soybean production across the southern United States, with the potential to reduce yields by up to 79% when left uncontrolled. Over the past decade, management has become increasingly difficult as populations have developed resistance to multiple herbicide groups, including glyphosate, ALS inhibitors, PPO inhibitors, and more recently S-metolachlor. As a result, soybean growers are running out of reliable and affordable control options.

In this study, I will test three plant-derived phenolic compounds—caffeic acid, coumarin, and chlorogenic acid, as potential bioherbicide candidates against Palmer amaranth. Both pre- and post-emergence assays will be used to evaluate their ability to suppress germination and early growth across a range of concentrations. To better understand how these compounds affect the plant, I will also measure indicators of oxidative stress, membrane damage, and key enzyme activity, along with gene expression changes using qRT-PCR. Finally, I will test whether the most effective compound is safe for soybean at the same concentrations.

Because these compounds are naturally occurring and biodegradable, they could offer a starting point for developing lower-input weed management options. If effective and selective, this work will provide early-stage evidence for a new approach that could eventually be integrated into soybean production systems in the southern U.S.



Presenter: Venkata Sai Deepak Mutta

Presentation Type and Session: Poster, P5

Level of Study: PhD

Department: Mechanical Engineering

Advisor: Dr. Soroush Korivand, Assistant Professor, Michael W. Hall School of Mechanical Engineering

Title: Predictive Action Refinement for Learned Robot Navigation Policies

Abstract: For robots operating in real-world environments, reaching a destination is not enough; they must also move safely and reliably. Robots can learn navigation policies from demonstrations, but the resulting actions may not always satisfy these requirements. This research presents a cost-guided flow-matching action refinement method that improves a robot's planned movements during navigation without retraining the original learned policy. A learned dynamics model predicts how the robot will move under a proposed sequence of actions, and the predicted motion is evaluated based on progress toward the goal, smoothness, obstacle avoidance, control effort, and physical feasibility. This cost-guided evaluation is then used within the flow-matching process to refine the planned actions before execution.

The method was evaluated in simulation using NVIDIA Isaac Lab with a mobile robot over 50 navigation trials per method (100 trials total). Each episode consisted of 250 control steps at a control frequency of 20 Hz, corresponding to 12.5 s per episode, while the simulation operated at 60 Hz. Compared with the original learned policy alone, the proposed cost-guided flow-matching method reduced the average final distance to the goal from 0.776 m to 0.431 m, representing a 44% reduction. The average time spent within the goal region increased from 4.5 s to 7.2 s, representing a 60% increase, indicating an improved ability to reach and remain near the desired target. Both methods remained collision-free in all 50 trials each, demonstrating improved goal-reaching performance without a corresponding loss of safety. These results suggest that predictive action refinement through cost-guided flow matching can improve goal-directed navigation and may benefit autonomous mobile robots in applications such as warehouse logistics, autonomous delivery, and field robotics.



Presenter: W.D. Thushni Sadana Wickramarathna

Presentation Type and Session: Flashtalk, F2

Level of Study: PhD

Department: Chemistry

Advisor: Dr. Colleen Scott, Professor, Department of Chemistry

Title: Synthesis and Characterization of DMDPP-Based Vinyl Flanked Conjugated Polymers for Conductive Materials Applications

Abstract: Donor–acceptor conjugated polymers have attracted significant attention owing to their tunable electronic properties and potential applications in organic electronics, sensing, and energy-related devices. In this work, a diketopyrrolopyrrole (DPP)-based conjugated polymer incorporating a dimethyl-substituted DPP (DMDPP) unit was synthesized and studied for its optoelectronic properties. The molecular design combined the strong electron-accepting nature of the DMDPP core with electron-rich aromatic building blocks to promote charge transport and enhance polymer conductivity.

The DMDPP monomer was developed in our group. Polymers containing the DMDPP unit were synthesized by Stille reaction conditions and purified through sequential Soxhlet extraction. Structural characterization was performed using ^1H NMR spectroscopy and FTIR analysis, confirming successful polymer formation. Gel permeation chromatography (GPC) revealed moderate molecular weights and narrow molecular weight distribution. The optical and electronic properties of the polymer were investigated using UV–Vis spectroscopy and electrochemical measurements, demonstrating broad absorption and promising electronic characteristics associated with donor–acceptor architectures. Thermal analysis further indicated good stability suitable for potential device fabrication.

These results demonstrate that DMDPP-based conjugated polymers represent promising candidates for conductive polymer applications. Ongoing studies focus on correlating molecular structure with charge transport behavior and evaluating performance in electronic and energy-related devices.



Presenter: Yehani Ekanayake

Presentation Type and Session: Flashtalk, F4

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dr. Nuwan K. Wijewardane, Assistant Professor, Agricultural and Biological Engineering

Title: Spectroscopic Prediction of Biological Soil Health Indicators Across Different Soil Preparation Conditions

Abstract: Rapid measurement of biological soil health indicators is important for soil health assessment, but conventional laboratory measurements can be time-consuming and labor-intensive. Mid-infrared (MIR) and visible–near-infrared (Vis–NIR) spectroscopy provide rapid approaches for soil analysis and have potential for use in field-based soil sensing systems. However, prediction performance may vary depending on soil preparation, spectrometer type, spectral preprocessing, and modeling approach. Evaluating whether biological soil health indicators can be predicted directly from fresh soil is particularly important for the future development of field-based spectroscopic sensors that require minimal sample preparation.

This study evaluates the prediction of biological soil health indicators using spectra collected under three soil preparation conditions: fresh, 2-mm sieved, and finely ground soil. Samples collected from benchmark soil series across Mississippi were scanned using two MIR instruments, Bruker Alpha II-ATR (2500–28,570 nm) and ArcOptix (2000–6000 nm), and two Vis–NIR spectrometers, ASD LabSpec 4 (350–2500 nm) and NEO (1350–2550 nm), where measurements were available. The biological indicators evaluated include CO₂-burst, active carbon, Solvita SLAN, and extractable glomalin-related soil protein (GRSP). Raw spectra and six preprocessing approaches are evaluated: normalization, standard normal variate (SNV), Savitzky–Golay (SG) smoothing, SG+SNV, and first- and second-derivative preprocessing.



Presenter: Yulia Kizner

Presentation Type and Session: Flashtalk, F3

Level of Study: PhD

Department: Kinesiology

Advisor: Dr. Jim Watkins, Assistant Professor, Department of Kinesiology

Title: College Students and Pickleball: Motivations for Participation

Abstract: Since the COVID-19 pandemic, pickleball has become the fastest-growing sport in the United States, with participation increasing by 223.5% from 2020 to 2023. Although existing research has primarily examined pickleball participation among middle-aged and older adults, limited attention has been given to the factors that motivate college students to participate in the sport. Therefore, the present study examined the factors that influence college students to engage in pickleball, using the Theory of Planned Behavior (TPB) as a guiding framework.

A qualitative research design was employed, using semi-structured interviews with 18 participants who, at the time of the research, were enrolled at the university as undergraduate or graduate students. Interviews explored participants' pickleball experiences, including their playing background, skill level, and length of participation, as well as factors that influenced their decision to engage in the sport. Thematic analysis identified six themes: social interaction, accessibility, physical wellness, psychological wellness, challenge, and external influences. The findings suggest that students' engagement with pickleball was shaped by multiple, interconnected motivational factors. These findings provide implications for campus recreation departments and other practitioners seeking to develop and tailor their pickleball programs to the needs and interests of college students.



Presenter: Zack Murphy

Presentation Type and Session: Flashtalk, F5

Level of Study: PhD

Department: Agricultural and Biological Engineering

Advisor: Dr. David Vandenhoeffer, Agricultural and Biological Engineering

Title: Investigating the effects of hormonal birth control on cognition

Abstract: Numerous functional MRI and positron emission topography (PET) studies have demonstrated that hormonal contraceptive (HC) use is associated with both structural and functional changes in the adult brain. The adolescent brain is thought to be even more vulnerable to synthetic hormones such as progestin, yet HCs are routinely prescribed to adolescents. fMRI and PET are highly effective methods, but they also come with a high cost and low portability. Electroencephalography (EEG) is comparatively inexpensive & portable, allowing for research to be conducted outside of specialized imaging centers and potentially on site in children's clinics. In order to support future EEG based research efforts on HC in an adolescent population, our lab is testing a novel method for examining the functional differences between HC and non-HC users. Preliminary results in a sample of 20 young adult women suggest that HC use is associated with stronger neural responses to sad emotional stimuli when compared with a control group of non-HC users, suggesting that HC use may modulate the way emotions are processed in the brain, consistent with results from previous fMRI studies. These results warrant continued research and will support future efforts to understand the effect of HCs on the adolescent brain.



Presenter: Zeenat Islam

Presentation Type and Session: Flashtalk, F4

Level of Study: PhD

Department: Computer Science and Engineering

Advisor: J. Adam Jones, Associate Professor and Associate Department Head, Computer Science and Engineering

Title: Temporal Characteristics of Vision in Virtual Reality

Abstract: Modern virtual reality (VR) head-mounted displays use low-persistence technology—brief illumination periods followed by dark intervals—to reduce motion blur and improve visual clarity. However, aggressive low-persistence settings (low duty cycles) can produce visible flicker, particularly in peripheral vision, where temporal sensitivity may differ from foveal vision. This dissertation characterizes the relationship between display duty cycle and flicker perception across the visual field to inform low-persistence VR display design.

The work includes an interdisciplinary literature review synthesizing low-persistence research across psychophysics, neuroscience, and display technology; photodiode-based measurements characterizing persistence profiles across VR head-mounted displays; and a novel VR-based visual field testing paradigm extending perimetry to 70° eccentricity. Three psychophysical experiments systematically evaluate flicker perception by varying duty cycle through black-frame insertion across the visual field, from foveal to far peripheral vision. Signal Detection Theory is used to distinguish perceptual sensitivity from response bias.

Results consistently show that flicker sensitivity to low duty cycles decreases with increasing eccentricity. The upper visual field also tolerates more aggressive low-persistence settings than horizontal regions, with these spatial patterns replicating across experimental paradigms. These findings provide region-specific evidence for designing spatially varying low-persistence parameters in wide-field VR displays.



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