

# NEWS FROM THE UNDERGRADUATE RESEARCH CENTER

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## Three for the Price of One

The new year is finally here, and this will be the **BIGGEST** year yet for the Undergraduate Research Center! If ever there was a newsletter issue to pay attention to, *this is it*. This *three-part edition* is **JAM PACKED** full of wonderful information to help you make the most of your undergraduate research experience this year!

First up, we're coming at you with the most important dates that you can put in your calendars now! Note the deadlines for **URECA applications** (*page 3*), the **Spring Business Meeting and Luncheon** (*page 5*), and all things **Scholars Week** (*pages 6-9*).

Second, check out some amazing URECA Scholars and SOAR Members. Congratulations to our recent **Fall graduates** (*pages 10-13*), **Posters at the Capitol** presenters (*pages 15-19*), and our SOAR Student and URECA faculty of the month (*pages 20-22*).

Last but certainly not least, join us in welcoming **Dr. Karen Nourse** to the URC newsletter (*page 23*). Each month, she will share her invaluable wisdom pertaining to research projects from start to finish. We are excited to hear from her each month, and she is a great resource for students.



Until next time,  
Ross Sibley, Editor  
(rhs2x@mtmail.mtsu.edu)



Undergraduate  
Research Center

## URC'S MISSION

The Undergraduate Research Center's (URC) mission is to be the central hub for communication about undergraduate research grant programs and other related opportunities on and off campus, to distribute university funds for undergraduate research and creative projects, and to promote dissemination of results through travel grants and by offering opportunities for students to present their research findings.

# THE URC TEAM

**YOU**, our students and faculty, are our **#1 priority**. We are here to help however possible, whether it is getting you involved in undergraduate research, helping you find a faculty mentor, thinking through a research or creative activity project, hosting a workshop on a topic of need, or facilitating events. Meet our team!



Jamie.Burriss@mtsu.edu  
Phone: 615.494.7669

## DR. JAMIE BURRISS

Dr. Burriss oversees the URC, the Student Organization for the Advancement of Research (SOAR), SOAR Ambassadors, the URECA grant program, communications, Scholars Week, Posters at the Capitol, and all other activities related to the URC.

Prior to returning to MTSU, Dr. Burriss served as the Curriculum Administrator for the SELECT MD Program at the University of South Florida while pursuing her doctorate. After USF, she accepted a position at Vanderbilt University as the Assessment Analyst for the College of Medicine. But, her heart has always been TRUE BLUE and she is happy to once again serve her undergraduate alma mater.



Channon.Fults@mtsu.edu

## CHANNON FULTS

Program Assistant

Channon was born and raised in Murfreesboro, TN. She graduated MTSU in 2006 with a Bachelor's degree in Interior Design and a minor in Human Sciences. Between working part time with the URC program and being a Mom she continues to pursue her interior design career as well. She is excited to be joining the URC team and is eager to be a part of helping enhance student education at her alma mater.

## URC Student Workers



## ROSS SIBLEY

**Major:** Biochemistry

**SOAR Involvement:**

President, Communications & Social Media Ambassador

**Fun Fact:** Ross was funded to present his research in the UK at the World Congress on Undergraduate Research.



## SOPHIA ROBERTS

**Major:** Sociology

**URC Involvement:**

Research Assistant

**Fun Fact:** Sophia graduated in December 2023 with the Scholar Distinction in Undergraduate Research.

# SPRING URECA GRANTS

NEW APPLICATION DEADLINE: FEB 1ST, 2024 BY 4:30PM



## Want to get paid to do research or work on a creative project?

THEN CHECK OUT OUR UNDERGRADUATE RESEARCH AND CREATIVE ACTIVITY GRANTS

To support our vision of nurturing a culture of research and creative activity at MTSU, the URC offers Undergraduate Research Experience and Creative Activity (URECA) grants to students three times a year. Awards range from \$500 for beginners to \$3,500 for experienced researchers.

Team applications are now being offered during the fall, spring, and summer semester. More information about the team structure can be found [here](#).

To learn more about URECA grants and how to submit proposals, check out our [website](#).

**NEW!!** Need assistance finding a mentoring or figuring out which level grant is best for you? Contact our Peer Mentor Scholar, Emilie Conners, at [emc5w@mtmail.mtsu.edu](mailto:emc5w@mtmail.mtsu.edu). Emilie can also help with proposal development, budget and justification, creating a timeline, and proposal review.



### STUDENTS MAY APPLY FOR THE FOLLOWING LEVELS:

**Assistant** - beginners, one semester project, \$500 stipend

**Silver Scholar** - experienced student researcher, one semester project, \$1000 stipend

**Gold Level** - experienced student researcher, 2 semester project (fall & spring), \$2,400 stipend

**Team** - All levels

**UNDERGRAD  
RESEARCH  
PEER MENTOR**

**OFFICE  
HOURS**



**EVERY MONDAY  
3-4 PM**



**I'M HERE TO HELP YOU...**

- **GET INVOLVED IN UNDERGRAD RESEARCH**
- **APPLY FOR A URECA GRANT**
- **FEEL CONFIDENT ABOUT IT!**

**REACH OUT TO ME (EMILIE CONNERS)  
AT [EMC5W@MTMAIL.MTSU.EDU](mailto:EMC5W@MTMAIL.MTSU.EDU)**



**STUDENT ORGANIZATION FOR THE ADVANCEMENT OF RESEARCH**

# *Spring Business Meeting & Luncheon*



**JOIN US FOR LUNCH AS WE DISCUSS UPCOMING OPPORTUNITIES IN UNDERGRADUATE RESEARCH!  
ALL ARE WELCOME!**

**JANUARY 31ST, 2024**

**12:30-1:30PM**

**STU GALLERY ROOM 206**

**RSVP HERE!**



Student Organization for  
the Advancement of Research

# SAVE THE DATES!



- ★ **February 1:** Deadline for t-shirt design submission ([Apply Here!](#))
- ★ **February 1-15:** Classroom Pop-Ins ([Sign up here!](#))
- ★ **February 5-16:** T-shirt design voting
- ★ **February 25:** Presenter Registration Deadline
- ★ **February 26:** Acceptances sent out via email
- ★ **February 20-March 8:** Poster printing
- ★ **March 15:** Research and Creative Activity Exposition

# MEET THE SCHOLARS WEEK COMMITTEE!



## 2023- 2024



**EDEN ANDERSON**



**MEIROLA ENDRAWS**



**RAND HASAN**



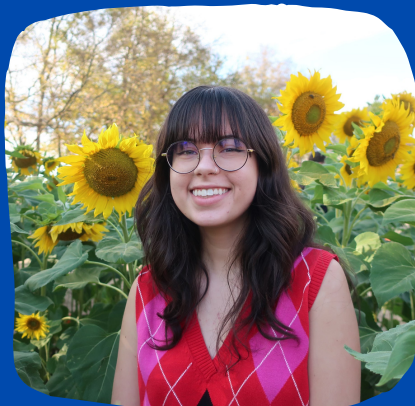
**SARAH KAMARIDNOVA**



**HANNAH FERREIRA**



**MAVERICK HOUSTON**



**HANNAH ANTRICAN**



**MICHAELA HARRISON**

# SCHOLARS WEEK 2024

## *T-shirt Competition*

DO YOU WANT EVERYONE TO BE WEARING **YOUR** SHIRT? APPLY!

### DETAILS:

-  **MUST BE A SOAR MEMBER TO SUBMIT YOUR DESIGN**
-  **DEADLINE TO SUBMIT: FEBRUARY 1, 2024**
-  **DESIGN WILL BE VOTED ON BY THE ENTIRE MTSU COMMUNITY**
-  **PRIZE INCLUDES: RECEIVES A SCHOLARS WEEK MEDALLION, T-SHIRT WITH YOUR DESIGN, AND RECOGNITION AT SCHOLAS WEEK 2024**



**SCAN HERE  
TO APPLY!**



EMAIL EDEN ANDERSON AT [ELA3E@MTMAIL.MTSU.EDU](mailto:ELA3E@MTMAIL.MTSU.EDU) WITH ANY QUESTIONS!



# GROUP LEADERS NEEDED

## Event Details

- Friday March 15, 2024
- 10:30am-12:00pm
- During morning session at Scholars Week Expo
- Student Union Gallery Room

**Lunch and Compensation are Provided!**

## READY to SOAR 2024

Join us for the annual **READY to SOAR** group discussion session, where we introduce local high school students to undergraduate research!

You will host a guided round-table discussion with HS juniors and seniors about your research journey, how you got started, and how it has impacted you.

The goal is to get students excited about research, clarify what research is, and guide them on how to get involved should they attend college.

Talking points will be provided, and involvement will count as active participation in SOAR



To volunteer or for any questions, please contact **READY to SOAR** Internal Project Coordinator Mina Abdulkareem

[mka3s@mtmail.mtsu.edu](mailto:mka3s@mtmail.mtsu.edu)

# GRADUATED URECA SCHOLARS

FALL 2023

## SCHOLAR DISTINCTION IN UR

Janna Abou-Rahma  
Lillian Bergman  
Rachel Booher  
Brooke Busbee  
Sammi Hamdan  
Javier Hernandez  
Gracie Johnson  
Matthew Johnson  
Ben Matthews  
Lacon Parton  
Sophia Roberts  
Sylvia Zakher

## DISTINCTION IN UR

Madonna Aziz  
Jacob Grones  
Marina Khalil  
Savannah Lawwell  
Hailey Simmons

## GRADUATING SOAR VETERANS

Steven Brown  
Javier Hernandez  
*"Thank you for your service!"*





**Plans After MTSU:** Obtaining PhD in Chemistry or Chemical Biology, Then Work in Industry for Drug Discovery

**Impact of UR:** Undergraduate research would be arguably the most important activity I've participated in through my degree as it has not only prepared me for the future but the challenges associated and the relationships I've built as a part of the process have helped me grow as an all around individual and the memories I've made will last a lifetime.

**Favorite Memory:** Defending my thesis and traveling to Durham to present my research at the SERMACS conference.

**Matthew Johnson**



**Plans After MTSU:** Obtaining a PhD in Chemical Biology and Working in Drug Delivery Mechanisms

**Impact of UR:** Coming into college, I was set on attending PA school. My desire for pursuing medicine was much deeper than "helping people", and more that I wanted to be the one who heard and understood those who felt unheard. But then performing drug discovery and drug delivery research made me realize...when you go to the doctor and they hear you, they prescribe medicine. And ultimately, the medicine is doing the helping. So while my path has changed, I am essentially achieving the same end goal of reaching audiences that need help and need support. If I hadn't participated in research, I may have not realized this, but it is some of the most valuable knowledge I have gained. My best advice to whoever may see this...don't be opposed to change. Sometimes, change is a good thing.

**Favorite Memory:** Presenting and networking at SERMACS.

**Gracie Johnson**



**Plans After MTSU:** Medical School

**Impact of UR:** The URC has allowed me the opportunity to share my research with individuals at a national and global level, which I had never thought would be possible for me. I have gained countless technical and soft skills that I will take on with me throughout not only medical school but also my day to day life. I have learned to work with others, work outside of my comfort zone, and look for new opportunities to help me get to where I want to be. The URC has prepared me to move forward in my career in countless ways!

**Favorite Memory:** What stood out to me the most from my undergraduate research experience would be participating and winning the Mayo Clinic's SDoH competition. I had always looked up to the Mayo Clinic and meeting the individuals that made up this amazing organization was something so surreal and memorable to me!

**Janna Abou-Rahma**



**Plans After MTSU:** Pursue a Masters Degree in Higher Education Administration

**Impact of UR:** Undergraduate Research has given me the experience I needed to decide my career path, the tools to find success in it, and the connections to find joy in it.

**Favorite Memory:** Being able to present my work at multiple conferences is an experience that will always stay with me. I never left one without making a new friend, and sometimes more than that.

**Brooke Busbee**



**Plans After MTSU:** Teaching High School Biology, Chemistry, Physics

**Impact of UR:** Undergraduate Research showed me how much I love utilizing data in my classroom, and it helped me to better encourage my students to use primary literature.

**Favorite Memory:** My research partner, Cassie, and I were cranking out HPLC data for our thesis proposals. We were in the lab until about 2 AM, and we shared a lot of Chick-Fil-A and many laughs. We were pretty delusional after working in the lab for about fifteen hours.

**Savannah Lawwell**



**Plans After MTSU:** Graduate School for Environmental Justice, Health, and Education

**Impact of UR:** Through my early involvement in research, I have discovered this is where my heart and passion lies. Hence, I intend to hold research at the core of my future academic focus and career journey. The leader, friend, student, and worker I am today has been greatly influenced by my involvement in undergraduate research.

**Favorite Memory:** The most memorable moment from my undergraduate research was right after submitting my first manuscript to a peer-reviewed journal for publication. Being first author on this manuscript, I felt on top of the world. After more than a year's worth of hard work, this moment was beyond exciting and rewarding.

**Sophia Roberts**



**Plans After MTSU:** I plan to apply to medical school next cycle and work in a research lab in the meantime.  
**Impact of UR:** Undergraduate research was hands down one of the best opportunities that I am grateful to have had. It allowed me to solidify what we were learning in the classroom in real life applications. I also saw the immense impact research has on Physician decisions in how to treat patients. I am thankful that I was able to see to the behind the scene of how researchers in fact help patients even if it's in an indirect way.  
**Favorite Memory:** The most memorable moment from my undergraduate research was when I presented in CBAS presentations during Scholars Week.

**Marina Khalil**



**Plans After MTSU:** After graduation, I'll be commissioned as an Army officer. I'm excited about the experience it'll give me, and I want to travel and make great connections.  
**Impact of UR:** The URC has opened so many doors for me, and I'm excited for future opportunities because of it! Now that I've conducted a film marketing research project, I hope that one day, it'll help me get a marketing job at Walt Disney Co.  
**Favorite Memory:** Assisting at Posters at the Capitol was my greatest memory with the URC.

**Javier Hernandez**



**Plans After MTSU:** I will be attending medical school to become a physician!  
**Impact of UR:** It has helped me to become a greater speaker and able to discuss topics that are traditionally hard to put into words. I have grown a great deal of confidence and have been able to meet exceptional scholars!  
**Favorite Memory:** My most memorable moment was having the opportunity to share my research at the Tennessee Capital. I loved having the opportunity to specifically discuss pressing, local issues with state officials.

**Lacon Parton**

# UNDERGRADUATE RESEARCH GRADUATION DISTINCTIONS

## LEVELS OF RECOGNITION:

### Distinction in Undergraduate Research

- Students receive a dark blue, light blue, and white cord

### Scholar Distinction in Undergraduate Research

- Students receive a dark blue, light blue and white cord AND a medallion (see image to the right)



## DISTINCTION CRITERIA

### Distinction in Undergraduate Research

\*Students must fulfill all requirements

- 1 Successful completion of an Assistant level URECA project - 50 hours of research or more.
- 2 Poster presentation or creative performance at one of the URC's signature events: Fall Open House, Scholars Week, or Summer Research Celebration.
- 3 Active participation for at least one academic year in the Student Organization for the Advancement of Research (SOAR).
- 4 Confirmation of support from URECA faculty mentor.

### Scholar Distinction in Undergraduate Research

\*Students must fulfill all requirements

- 1 Successful completion of a Scholar level URECA project - 100 hours of research or more.
- 2 Poster presentation or creative performance at one of the URC's signature events: Fall Open House, Scholars Week, or Summer Research Celebration.
- 3 Active participation for at least one academic year in the Student Organization for the Advancement of Research (SOAR).
- 4 Poster or presentation at the National Conference on Undergraduate Research or published in a peer-reviewed academic journal.
- 5 Confirmation of support from URECA faculty mentor.

# STUDENT ABSTRACTS: POSTERS AT THE CAPITOL 2024



**Faculty Mentor:**  
**Dr. Tiffany Saul**  
**Hometown: Murfreesboro, TN**

## AUDREY LAUERHASS

### *Examining the Utility of Spatial Analysis of Artifact Distribution at a World War II Aircraft Crash Site*

At aircraft crash sites, the use of geographic information system (GIS) mapping technologies can allow for a greater spatial understanding of aircraft wreckage (ACW) distribution and improve the recovery of human remains. Creating predictive models assists with concentrating efforts and resources in areas likely to contain material of interest. At a World War II crash site, portions of the roughly 450 x 350 meter site were systematically scanned via metal detection, sampled, and documented. All ACW was analyzed based on its original location on the aircraft. The coordinates of positional ACW and the number of metal detection hits were entered into ArcGIS Pro with other spatial data. The creation of a detailed distribution map of the aircraft debris field guided excavation strategies in the third year of the recovery project and demonstrated that spatial analysis of large aircraft crash sites is an effective tool for maximizing resources for successful recoveries.



**Faculty Mentor:**  
**Dr. Ying Gao**  
**Hometown: Murfreesboro, TN**

## ISAIAH KAM

### *Extraction of sweet wormwood (*Artemisia annua* L.), a medicinal plant, and evaluation of its terpene content*

Employed to manage fungal diseases, synthetic fungicides have occupied the market due to their accessibility and standardized usage. With the demand for a sustainable alternative, botanical fungicides became implemented into agricultural sectors. This study was aimed to promote further research on the medicinal plant, *Artemisia annua* L., also known as sweet wormwood, and how its bioactive compound, terpene, can be maximized and contribute to a larger botanical fungicide project. Known for their antifungal and antimicrobial properties, various extraction methods were implemented to maximize the biological properties of terpenes. These methods include Microwave-assisted extraction, Sonication-assisted extraction, and Soxhlet extraction. For the experiments, various solvents such as DI water, ethanol, and hexane were tested. These samples were then tested with the  $\alpha$ ,  $\alpha$ -diphenyl- $\beta$ -picrylhydrazyl (DPPH) method to determine the antioxidant capacity of the extracts. The samples will be tested for their antifungal activity against *Alternaria alternata* using the agar dilution assay. Following the extractions Liquid Chromatography Mass Spectrometry (LC-MS) analysis will be performed to analyze the terpene molecules within the extracted samples. Providing new insights into future studies of sweet wormwood, the results of this study have enlightened our understanding of the compound, terpene, and what extraction method yielded the most efficient result.

# STUDENT ABSTRACTS: POSTERS AT THE CAPITOL 2024



## ROSEMARY GUTIERREZ

### *Electromagnetic Ionization and Radiation Creation in Neuroblastoma Cancer Cells*

Neuroblastoma is a common childhood cancer that has one of the highest incidence rates for children less than one year with poor prognosis as children age. Although current radiotherapy treatments are efficient, many patients are left with unpleasant side effects. Laser trapping is a technique that traps dielectric objects as small as an atom and as big as 100 micrometers with a high-power laser. The laser trapping technique with the addition of magnetic beads was used in this study to initially provide a more efficient treatment for neuroblastoma. This study determined that the amount of radiation received in neuroblastoma cells through laser trapping was significantly reduced. However, it was discovered that these neuroblastoma cells could produce radiation emission, which lasted over six hours with a consistent amount of over 93% energy absorption of an infrared light (low energy) resulting in intense visible radiation (high energy light). Using infrared laser light with neuroblastoma cells and magnetic beads has the potential to create a new source of energy of white light that has the blackbody radiation. The overall result of this study has indication of improving cancer treatment with significantly reduced radiation dose and also using cancer cells for harvesting solar energy.

**Faculty Mentor:**

**Dr. Daniel Erenso**

**Hometown: McMinnville, TN**



## EDEN ANDERSON

### *Detecting Estrogen Pollution in the Stones River Waterways using the Yeast Estrogen Screen (YES) test of "Saccharomyces cerevisiae"*

Estrogen is a steroid hormone, most well-known as being associated with the female reproductive system. Estrogen is used in the dairy and livestock industry as a muscle enhancer and used to increase growth rates. Once in the environment, estrogen enters the estrogen transmission chain, and the effects have been connected with disruptions in waterway ecosystems. This study aims to identify the levels of estrogen pollution for each site at the Stones River Watershed. Using the Yeast Estrogen Screen (YES), "Saccharomyces cerevisiae" was scientifically engineered to carry one DNA (either ER $\alpha$  or ER $\beta$ ) sequence and two estrogen-responsive sequences (ERE). The ERE controls the reporter gene, "lac-Z", which encodes for the enzyme  $\beta$ -galactosidase, and in the presence of estrogens, is secreted. The lysis buffer contains chlorophenol red- $\beta$ -D-galactopyranoside (CPRG). When cleaved by  $\beta$ -galactosidase, it produces a colorimetric product. This study distinguishes a practical way to identify said pollutions and promotes a better understanding of what estrogen pollution can do towards biodiversity. The study also confirms why testing our local Stones River Watershed is very important, as it improves our ability to protect against threats towards biodiversity and possible contamination.

**Faculty Mentor:**

**Dr. Rebecca Seipelt-Thiemann**

**Hometown: Lebanon, TN**



# STUDENT ABSTRACTS: POSTERS AT THE CAPITOL 2024

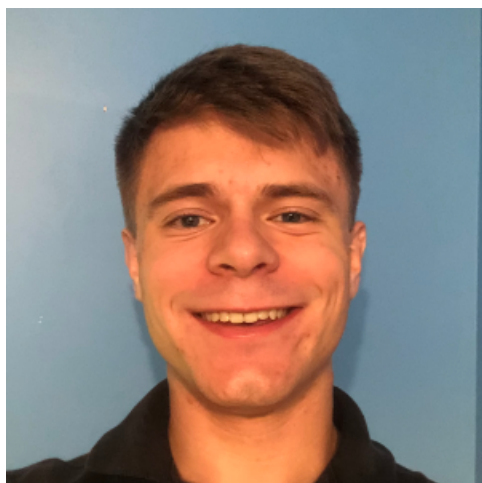


**Faculty Mentor:**  
**Dr. Charles Chusuei**  
**Hometown: Memphis, TN**

## SYDNEY ROBBINS

### *Electrochemical Detection of Fenthion for Forensic Analysis*

Fenthion is an insecticide that has been widely used to protect crops against pests, however its toxicity has led to environmental and health concerns. Because of the harms fenthion presents, the ability to rapidly and accurately assay this pesticide is essential for forensic investigations of suicides, environmental violations, and poisonings. Electroanalytical techniques have been shown to be advantageous in detecting pesticides. Cyclic voltammetry is an electrochemical technique used to determine the reduction and oxidation of analytes in order to identify unknown compounds. The efficiency of cyclic voltammetry to detect trace amounts of fenthion is reportedly increased with the use of nanoparticles to modify the electrode used. The electrocatalytic capabilities of various nanomaterials drop-casted onto glassy carbon electrodes for fenthion detection will be presented to provide a non-destructive, cost efficient, time sensitive, and reliable method of fenthion detection that can be applied to forensic investigation, environmental protection, and public health efforts.



**Faculty Mentor:**  
**Dr. April Weissmiller**  
**Hometown: Goodlettsville, TN**

## COLE HUDDLESTON

### *Biological Evaluation of Novel Tubulin Inhibitors for Treatment of Cancer*

Cancer is a leading cause of death worldwide. Cancer cells are defined by uncontrolled and abnormal cell division. Therefore, inhibiting cancer cell division is a validated anti-cancer approach clinically. Both cell structure and cell division depend on active microtubule dynamics, which is a process in which alpha and beta subunits of tubulin polymerize and depolymerize. Small molecule tubulin inhibitors are used in chemotherapy cocktails to treat various cancers, however current tubulin inhibitors are toxic and cancer cell resistance can occur. To overcome these issues, I have been part of a research project to discover novel tubulin inhibitors that target the colchicine binding site on the beta subunit. Paneling of these novel small molecules that are potential tubulin inhibitors reveals that out of those tested, two compounds show the potential to inhibit tubulin polymerization directly and cause effects consistent with tubulin inhibition in cancer cell lines. The data from this research will help to understand which chemical structures function best to impair microtubule dynamics. Design and testing tubulin inhibitors like these may be able to overcome issues with those currently in the clinic and ultimately could be developed to aid patients in their fight against cancer.

# STUDENT ABSTRACTS: POSTERS AT THE CAPITOL 2024



## TORI BASCOU

### *Investigation of Water Effect on Ignitable Liquid Residue Analysis by Coupling Solid-Phase Microextraction with Direct Analysis in Real Time Mass Spectrometry*

Arson investigation and explosive analysis is a subfield of forensic science that focuses on examining the physical evidence that is collected from a scene in which a fire occurred. Accelerants and ignitable liquids (ILs) are often used in arson fires to maximize the damage that the fire creates. Common ILs include lighter fluid, kerosene, and gasoline, with gasoline being one of the most volatile compounds. Direct analysis in real time-mass spectrometry (DART-MS) is known for its ability to analyze volatile compounds that have been exposed to weather conditions and its ability to demonstrate the sensitive detection of explosives. In recent research, the DART-MS was coupled with an extraction method called Solid Phase Microextraction (SPME), in order to aid in the analysis of IL residue on substrates (i.e., wood floor, paper). This study hypothesizes that water could interfere with gasoline residue analysis by DART-MS which is dependent on the gasoline to water ratios and the type of substrates. The objective is to conduct a comprehensive evaluation of the water effect in gasoline residue detection by DART-MS method and is expected to provide results that will aid in the better understanding of water and substrates factors in the IL detection method.

**Faculty Mentor:**  
**Dr. Mengliang Zhang**  
**Hometown: Murfreesboro, TN**



## ARIEL NICASTRO

### *Ultrasound Forcing: Device Design and Applications in Neuromodulation*

Neuromodulation, the manipulation of neural activity using focused ultrasound, is a growing interdisciplinary field with a major goal of noninvasively treating disorders in the brain such as epilepsy, chronic pain, and migraines. In order to advance towards these goals, it is crucial to study neural systems in isolation to directly observe the impact of neuromodulation. For this reason, an ultrasound forcing device that can create focused ultrasound waves was designed and assembled. This square-shaped device fits inside a petri dish, and the vibration of its piezoelectric ceramic plates when connected to a function generator creates waves that propagate through the medium. We patterned microbeads in order to characterize the strength and spatial pattern of the acoustic forcing. This ultrasound forcing device has been used in experiments attempting to stimulate calcium activity in human neural progenitor cells, and can be used to conduct further experimentation on neural networks.

**Faculty Mentor:**  
**Dr. Wolfgang Losert (UMD)**  
**Hometown: Franklin, TN**

# STUDENT ABSTRACTS: POSTERS AT THE CAPITOL 2024



## LINDSEY TRAN

### *A Preliminary Study: Harvesting and Storing Electromagnetic Radiation using Animal Blood and Micromagnetic Beads*

Electromagnetic (EM) radiation, omnipresent in our surroundings, serves diverse purposes from cellular communication to medical treatments and space exploration. Our research explores a preliminary study utilizing laser-trapping, micromagnetic beads, and animal blood for potentially revolutionizing EM energy harvesting and storage. The livestock industry annually generates an excessive 1.4 billion pounds of waste, primarily animal blood, representing a significant environmental concern. By utilizing blood samples from key livestock animals, including sheep, goat, chicken, bovine, turkey, horse, and porcine, our study produces enduring, self-sustaining EM radiation. The experiment involves a 3:1 mixture of animal blood and micromagnetic beads on a depression slide within an infrared laser trap, progressing through two phases: Plasma formation and Star-like radiation. In Plasma formation, exposure to the laser trap induces electric breakdown, ionizing blood cells and micromagnets, forming a dense plasma. The subsequent Star-like radiation phase accelerates the dense plasma, generating intense black-body radiation. The study attains 90-95% radiation energy absorption over 1.5 to 7.5 hours, marking a micro-level advancement in EM harvesting with animal blood. We envision this as a foundational step for macro-level applications like solar energy harvesting, offering potential benefits for the environment through waste reduction and enhanced safety in the livestock industry.

**Faculty Mentor:**  
**Dr. Daniel Erenso**  
**Hometown: Antioch, TN**

The MTSU cohort will travel to the Tennessee State Capitol alongside the following universities:

- Austin Peay State University
- East Tennessee State University
- **Middle Tennessee State University**
- Tennessee State University
- Tennessee Technological University
- University of Memphis
- The University of Tennessee at Chattanooga
- The University of Tennessee, Knoxville
- The University of Tennessee, Martin



# FEATURED SOAR STUDENT

**ALEX HAMILTON**



**Major:** Speech-Language Pathology & Audiology w/ a Psychology Minor

**Faculty Mentor:** Dr. Katheryn Blakenship

### **Current Research Focus:**

The Comparison of Two Different Word-Learning Strategies in Undergraduate University Students

### **Project Description:**

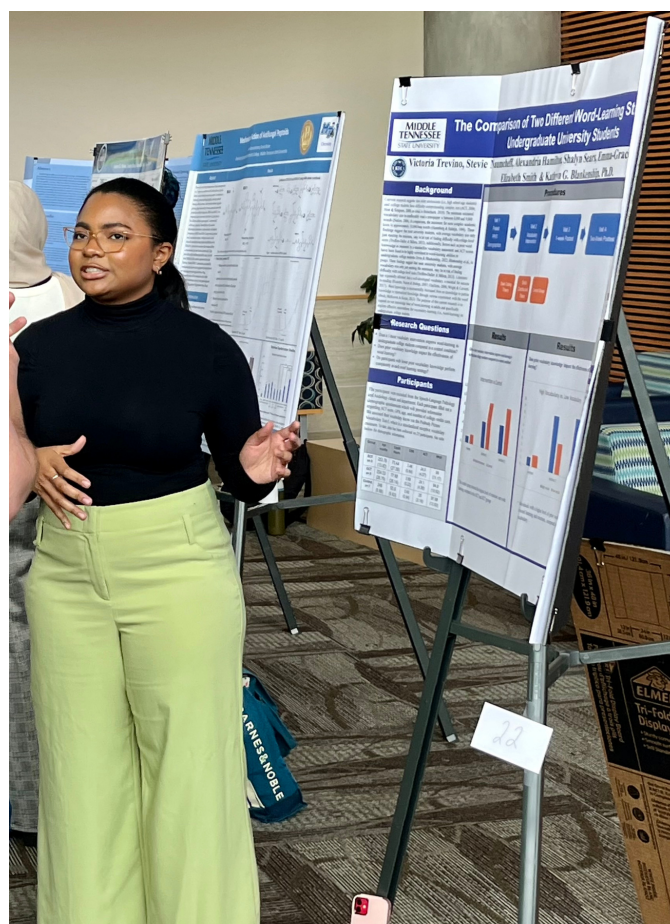
Current research studies have discussed that it is common for college students to find difficulty in comprehending college-level text. College students may encounter this challenge due to the advanced vocabulary that is included in the text along with the complexity of the reading material. The purpose of this current research is to expand on our knowledge base of word-learning in adults and specifically explore effective interventions for vocabulary-learning (i.e., word-learning) in undergraduate college students.

### **Why does this topic interest you?**

It is interesting to gain insight on which methods college students learn best with when learning advanced vocabulary terms. By learning about this, we can help other students by suggesting effective study methods and by providing resources that can be beneficial for their academic journey.

### **What are your professional aspirations?**

It is important to believe in yourself and to remind yourself that you are capable of pursuing your dreams and desires. You may have doubts in yourself, but it is important to continue going after the goals you want to achieve. Research is a great way to expand your learning, build connections with others, and to create new experiences.



**Check Out More SOAR  
Student Profiles Here!**

[MTSU.EDU/URC/SOAR-PROFILE/](https://www.mtsu.edu/urc/soar-profile/)

# What is the Student Organization for the Advancement of Research? AKA "SOAR"



SOAR is our awesome student organization comprised of undergraduate students who are committed to developing and sustaining an active and successful undergraduate research environment at MTSU.

## SOAR's Mission

To enhance student's research capacity through increased awareness, collaboration and skill building.

## Why Join?

- SOAR will enhance a student's research capacity through increased awareness, collaboration and skill building by offering workshops and trainings to fulfill the needs of undergraduate researchers.
- SOAR will assist students in the preparation of poster presentations and development of abstracts to increase conference presence on a national level, encourage students to attend the National Conference on Undergraduate Research, and facilitate travel preparations.
- SOAR will provide peer mentoring to students new to undergraduate research.



**JOIN SOAR!**

# URC FEATURED FACULTY MENTOR

## DR. JOSHUA PHILLIPS

**Department:**

Computer Science

**Research Interests:**

Molecular modeling and simulation, computational models of working memory, machine learning and neural networks

**Mentored URECA Projects:**

- Applying Induced Set Attention to Transformers for Object Detection (Summer 2023)
- StrXL: Adapting Set Transformer to Model Arbitrary Length Sets (Fall 2022)
- Validating the 1GB1 folding pathway using Greedy-Proximal A (Summer 2022)
- High Performing Scientific Computing as a Service in the Cloud (Fall 2020)
- Dynamic Threshold for the Partially-Observable and Non-Observable Working Memory Toolkit (Fall 2019)
- N-Task Learning on Partially-Observable Image (Fall 2019)
- Automatic Feature Association and Dynamic Threshold for the Combined Observable and Non-observable Task Switching Model (Summer 2019)
- Enabling Multi-Task Learning in Partially- and Non-observable Environments with Keras (Summer 2019)
- Combining Models for Observable and Non-Observable Task Switching to Achieve Working Memory for Autonomous Systems (Spring 2019)
- Unitization and Catastrophic Interference in Reinforcement Learning (Spring 2019)
- Dimensional Attention Learning for Working Memory (Spring 2019)
- Unitization Applied to deep reinforcement learning (Fall 2018)
- Application of N-Task learning on Traditional Computer Vision Problems (Spring 2018)
- Dimensional Attention Learning for Working Memory (Fall 2017)

**Check Out Our  
Expanded List of  
Faculty Mentor  
Profiles Here!**

[MTSU.EDU/URC/MENTORS](https://www.mtsu.edu/urc/mentors)

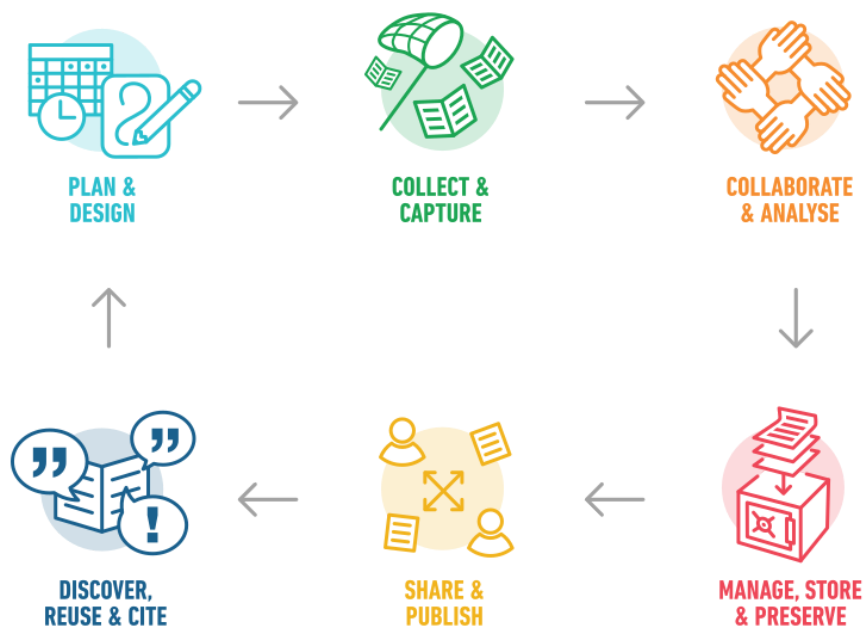
# NEWS FROM NOURSE



## The URC is excited to feature the wisdom of Dr. Karen Nourse, James E. Walker Library's Research & Data Librarian!

“Hi I am Dr. Karen Nourse, and I work in Walker Library as the Research & Data Librarian! I love my job because unlike a lot of librarians who only work with research at its end stage (when research is published), I work with research at every stage of the process: from initially planning a research project, to data collection and analysis, and finally the publishing and preservation of research. What this means is that I am an extra faculty member to help you with your undergraduate research project here at MTSU. I have several superpowers: I completed my Ph.D. at MTSU, so not only have I been through the research process myself in great detail, but I also know what it is to be an MTSU student while managing full-time work and life. Another superpower is that I am able to help MTSU students regardless of major or academic level (undergraduate or graduate). I have worked on many projects, and I want to help you succeed in your research.

Check out [my library webpage](#) for additional resources, or please contact me directly at [karen.nourse@mtsu.edu](mailto:karen.nourse@mtsu.edu) if I can be of assistance!”



# INTRODUCTION TO RESEARCH DATA MANAGEMENT SERVICES AT WALKER LIBRARY WORKSHOP

Did you know that MTSU has our very own research data librarian? Dr. Karen Nourse assists students with research design and analysis at every stage, from planning one's research to dissemination and archiving of the scholarly products. This workshop will introduce attendees to Dr. Nourse, as well as the range of services presented through the Research & Data Management LibGuide.



**JANUARY 30TH**  
1:00-1:30PM



ZOOM LINK ACCESSIBLE UPON SIGN-UP

**VIRTUAL**  
WITH  
**DR. KAREN NOURSE**  
RESEARCH &  
DATA LIBRARIAN



Undergraduate  
Research Center



# LOOKING TO START YOUR RESEARCH JOURNEY?

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Undergraduate  
Research Center

The URC's guide for upcoming student researchers, *Research Guide: How to Start your Student Research Journey*, is a great resource for undergraduates seeking to enter the world of research! This guide covers when to start research, how to find a project, student experiences, helpful advice, URC resources, and SOAR resources at MTSU.

The next time you are asked how to get involved in research, direct that student to this resource!

This guide was initiated, compiled, and formatted by Dara Zwemer.

Stories were provided by SOAR students, including Cassandra Perrone, Leah Piccirillo, Javier Hernandez, Robert Conner, Charlotte Daigle, Madeline Aadnes, Maria Fernanda Clark, Kylie C. Moe, Miquellie Bonner, Merry Young, Kaitlyn Berry, Zachary Sanchez, Kap Paull, and Christopher Hall.

We hope you find it useful!

UNDERGRADUATE RESEARCH CENTER AT MIDDLE  
TENNESSEE STATE UNIVERSITY

## RESEARCH GUIDE

HOW TO START YOUR STUDENT RESEARCH JOURNEY

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### Stories and Advice from Student Researchers

#### IN THIS GUIDE:

- When to Start..... 2
- Finding a Research Project..... 3
- Student Stories..... 4
- Helpful Advice..... 8
- URC: Here to Help ..... 11
- SOAR Resources..... 12

# Check Out Our STUDENT RESEARCH GUIDE

# OUT NOW: THE URC RESEARCH GROUPS & LABS DIRECTORY

**MTSU's outstanding Research Groups and State of the Art Laboratories, all in one place.**

The URC is proud to announce our new directory. This resource will allow students to learn about excellent MTSU labs and research groups across several disciplines. Both new and experienced student researchers can utilize this document to find research positions, set up collaborations with other labs, or to establish a specific thesis mentor.

This directory is also a resource for faculty members seeking student researchers. Each lab or group's accomplishments, publications, and goals are detailed within the pages of this directory.

This directory contains descriptions, key skills necessary, and semester openings for several labs, divided by specific college. To access the directory, click the button on the right or scan the QR code.

PDF copies of the directory are also available to print.

*\*Please send any additions or updates to our URC Research Assistant, Gracie Johnson:  
[gpm2h@mtmail.mtsu.edu](mailto:gpm2h@mtmail.mtsu.edu)*



[CLICK HERE](#)





**TECH**

**Vision**

MAY 29-JUNE 1, 2024

## Trust and Legitimacy in Emerging Technologies: Organizational & Societal Implications for People, Places and Power

### WHY PARTICIPATE?

We aspire to elevate MTSU as a leader in student-centered, interdisciplinary, and technology-driven research. Engage with industry, community, and regional education partners and share your research to impact our world. We welcome research involving technology across all academic domains!

**“ACM, the world's largest educational and scientific computing society, delivers resources that advance computing as a science and a profession.”**



### LOCATION

Jones College of Business  
Middle Tennessee State University



### PROCEEDINGS

Published in the  
ACM Digital Library



### CONTACT

sam.zaza@mtsu.edu



### REGISTER AND SUBMIT

[sigmis.org/cpr/submissions/](https://sigmis.org/cpr/submissions/)

# INTERSHIPS & RESEARCH OPPORTUNITIES

Check out the following opportunities for spring & summer research!

## [Cancer Research Summer Internship Program \(CaRSIP\) - University of Michigan](#)

- As part of its Cancer Biology Training Program, the University of Michigan Rogel Cancer Center provides exposure to cancer research for highly motivated and talented college undergraduates. This program gives the successful applicants an opportunity to explore potential careers in the field of cancer research. Internships are aimed at students who are completing their sophomore or junior undergraduate year this spring. **Apply by January 29th, 2024.**

## [Biomedical Research for University Students in Health Sciences \(BRUSH\) Summer Research Program - Michigan State University](#)

- BRUSH is an 11-week program for undergraduate and veterinary students interested in the biomedical sciences and research-related careers. The goal of the BRUSH Program is to provide hands-on research exposure and graduate or professional school preparation opportunities for individuals who are from populations underrepresented in biomedical research. Undergraduate students earn a stipend and are provided room and board for a total compensation package of approximately \$9,600. **Apply by February 12th, 2024.**

## [ACRES: Advanced Computational Research Experience for Students - Michigan State](#)

- ACRES is a 10-week summer Research Experience for Undergraduates (REU) in computational and data science hosted at Michigan State University. Research projects focus on applying computation to a variety of scientific disciplines, including computational chemistry, biology, astrophysics, mathematics, science education, and earth/climate sciences. Students will learn how to develop algorithms, models, and software for problems that require high-performance computing resources. **Apply by February 29th, 2024.**

## [Interdisciplinary Research Experiences for Undergraduates - Embry Riddle Aeronautical University](#)

- The participants will contribute to collaborative, interdisciplinary research projects relating to the Aerospace industry. Available research projects span a variety of methods and topics and aim to sustainably increase multidisciplinary research in aerospace engineering, chemistry, and applied space biology with the goal of improving future space materials science and human diagnostic technology. **Apply by March 8th, 2024.**

Interested in more opportunities? [Click here](#) to explore more internship/research opportunities!

# PAPER & PRESENTATION OPPORTUNITIES

Check out the following opportunities for papers & presentations!

## Scientia et Humanitas - MTSU Honors College

- Scientia et Humanitas, a journal of student research, is now accepting original, unpublished undergraduate and graduate research for its 2024 issue. We accept articles from every academic discipline offered by MTSU including the natural sciences, the social sciences, and the humanities. Eligible contributors are **all MTSU students and recent graduates, either as independent authors or with a faculty member.**
- Articles should be 10 to 30 typed double-spaced pages and may include revisions of papers presented for classes, conferences, or Scholars Week. Articles adapted from Honors or M.A. theses are especially encouraged. Papers should include a brief abstract of no more than 250 words stating the purpose, methods, results, and conclusion.
- To submit an article, check out our submissions page and our author guidelines. Articles may also be submitted directly to the editor at [scientia@mtsu.edu](mailto:scientia@mtsu.edu).
- The submission deadline is **Monday, February 12.**

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Check out the links below to explore other helpful resources!

[Internships and Research Opportunities](#)

[Student Journals](#)

[Paper and Presentation Opportunities](#)

[Student Resource Center](#)