



**TENNESSEE**  
STATE UNIVERSITY  
DIVISION OF RESEARCH AND  
SPONSORED PROGRAMS

# Evolution in Motion: Growing Research, Expanding Impact

Research Horizons:  
2025 Annual Report

**HBCUC<sup>2</sup>**  
BUILDING CODING &  
CREATIVITY EXPERIENCES  
ON HBCU CAMPUSES!



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# DWAYNE TUCKER



OFFICE OF  
THE PRESIDENT

**TENNESSEE STATE UNIVERSITY**  
3500 JOHN A. MERRITT BOULEVARD  
NASHVILLE, TENNESSEE 37209-1561



Dear Members of the University Community,

I am pleased to present the 2025 Research and Sponsored Programs Annual Report, which details the achievements of our faculty, staff, and students in securing and managing external funding for their research and scholarly endeavors. This report celebrates our commitment to research and provides a glimpse of the dedication of our research community toward innovation and discovery.

In 2025, our university secured over **\$78 million** from various funding agencies. This significant investment impacts every part of our campus. It funds career-relevant jobs for our students, creates new scholarship opportunities, and provides valuable networking connections that launch them into their future careers.

As we look at the incredible work highlighted in this report, we are reminded of the passion and perseverance that drive our community. Thank you for your tireless efforts and for your contributions to the future of our university and beyond.

Sincerely,

A handwritten signature in blue ink, reading "Dwayne A. Tucker".

Dwayne Tucker,  
Interim President  
Tennessee State University

"Think • Work • Serve"  
AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER M/F

ASSOCIATE VICE PRESIDENT FOR RESEARCH AND SPONSORED PROGRAMS AND  
CHIEF RESEARCH OFFICER

# DR. QUINCY QUICK

## Positioning TSU for the Future of U.S. Research

As we close another academic year, I write with immense pride in our collective achievements and with clear eyes toward the future of research at Tennessee State University.

Over the past three years, TSU has demonstrated historic growth in research productivity, competitiveness, and institutional resilience. We have seen record-setting levels of external funding, an expanding portfolio of sponsored programs, and a sharp rise in interdisciplinary scholarship that responds directly to society's most pressing challenges. Our sponsored research enterprise has not only grown in size but matured in complexity, governance, and impact.

Our success is especially meaningful in the context of our proud legacy as a Historically Black College and University. For over a century, TSU has been a symbol of excellence, perseverance, and ingenuity in the face of systemic underinvestment. Today, our proven ability to thrive under pressure is a distinct advantage as we navigate a shifting national research landscape.

The U.S. research environment is undergoing transformative change. Federal priorities are increasingly tied to national security, technological sovereignty, public-private translation, and applied innovation. In this climate, institutions that can demonstrate relevance, resilience, and readiness to partner with industry and government are best positioned to succeed.

TSU is ready.

This moment presents a profound opportunity—not only to sustain our momentum, but to expand our reach. By cultivating deeper collaborations with corporate partners, state agencies, and innovation ecosystems, we can amplify our impact and ensure that our research directly contributes to regional economic development and national competitiveness. In particular, we see tremendous potential in strengthening our partnerships with such partners as Tennessee Department of Economic and Community Development (TNECD) and other strategic allies who share our vision of inclusive innovation and workforce transformation.

Let us move forward together with boldness and intention. The nation is calling for research that delivers results. Tennessee State University will answer that call—not just as an institution with a storied past, but as a national model for what research excellence can look like in the 21st century.

With gratitude and resolve,



Quincy Quick, Ph.D.  
Associate Vice President  
Chief Research Officer  
Research & Sponsored Programs  
Tennessee State University





# RESEARCH CENTERS AND INSTITUTES

1890 Center of Excellence for Natural Resources,  
Renewable Energy, and the Environment (COE-NREE)

Agricultural Research and Education Center (AREC)

Biomedical Sciences Core Facility

Center on Aging Research and Education  
Services (TSUCARES)

Center for Prevention Research

Center of Biomedical Sciences

Center of Excellence for Battlefield Sensor Fusion

Center of Excellence for Information Systems and  
Environmental Management (COE-ISEM)

Center of Excellence for Learning Sciences (COELS)

College of Agriculture Cooperative Extension Program

Institute of Agricultural and Environmental Research

Nanoscience and Biotechnology Core Facility

Otis L. Floyd Nursery Research Center at  
McMinnville

SMART Innovative Technologies Division

Tennessee Small Business Development Center

TSU Interdisciplinary Graduate Engineering  
Research (TIGER) Institute



Site of New Food and Animal Sciences  
and Environmental Sciences Facilities for  
the College of Agriculture



Tennessee Small Business  
Development Center



2025 Research Symposium  
Award Ceremony

# UNIVERSITY RESEARCH CAPACITY

Founded in 1912, Tennessee State University, an Historically Black College and University (HBCU), fosters scholarly inquiry and research, lifelong learning, and a commitment to service. This 1890 land grant institution with three farms is Nashville's comprehensive public university, as well as a Carnegie R2 Doctoral – High Research Activity institution. Tennessee State University has a diverse range of research capabilities across STEM disciplines (Engineering, Computer Science, Physics, Biology, Chemistry, Math, Agriculture), with approximately (300) faculty who conduct cutting edge research in their respective fields.

Research facilities include over (100) basic science research laboratories and (16) research centers, institutes, and core facilities equipped with state-of-the-art equipment, that include high-performance computing capabilities, advanced imaging technologies, and analytical instrumentation.

Tennessee State University's research capacity is further strengthened by its partnerships with federal agencies, industry partners, and academic institutions. These collaborations enable TSU to expand its research spectrum and provide opportunities for cross-disciplinary research.

Faculty and staff have secured research grants from various sources, that include the National Science Foundation, Department of Health and Human Services, Department of Energy, Department of Defense, Department of Education, the State of Tennessee, and the U.S. Department of Agriculture.

Tennessee State University's research activity and portfolio are reflected in our diverse academic program offerings that include (38) Bachelor's Degree Programs, (24) Master's Degree Programs and (9) Doctoral Programs.

## Strategic Research Priorities

Tennessee State University delivers solutions from local to global challenges through strategic priority areas:

1. Cybersecurity, Cyber Physical Systems, Bioinformatics, & Interoperability
2. Renewable Energy
3. Big Data Analytics
4. Education Innovation and Leadership
5. Food Supply Security and Sustainability
6. Plant and Animal Genetics
7. Health Disparities and Disease Prevention/Treatment
8. Workforce Pipeline Development
9. Early Childhood Education
10. Rural Economic Development and Urban Planning
11. Biotechnology, Nanosciences, and Advanced Materials
12. Astrophysics
13. Transportation Systems
14. Advanced Manufacturing
15. Autonomous Vehicles
16. Robotics and Mechatronics

## Research Methods and Techniques

The university offers an array of techniques, approaches, methodologies, and services for solving the world's most pressing issues and aiding communities. Common approaches include Feasibility Studies, Economic Impact Modeling, Simulation Testing, Prototype Development, Data Mining, Trend Analysis, Market Analysis, Stress Testing, Automatic Target Recognition Testing, Learning and Behavioral Assessments, Confocal Imaging, and Needs Assessments.

For more information, contact the Office of Research and Sponsored Programs at [research@tnstate.edu](mailto:research@tnstate.edu).





# TSU QUICK FACTS: 2024 - 2025



Carnegie Classification: Doctoral Universities: High Research Activity (R2)



438 Full-time Instructional Faculty



Student-to-Faculty Ratio: 11:1



71 Majors in Eight Undergraduate and Graduate Colleges and Schools



520 Campus Acres, Two Campuses, Three Farms



Fall 2024 Undergraduate Student Enrollment: 6,765



Fall 2024 Graduate Student Enrollment: 1,433

# COLLEGES OF THE UNIVERSITY

## College of Agriculture and Human Sciences

The faculty of the College of Agriculture are engaged in conducting innovative research and communicating new knowledge through Extension activities in the agricultural and environmental sciences and human sciences. The College of Agriculture addresses the needs of humankind, focusing on finding solutions to challenges faced by socially and economically disadvantaged groups, and contributing to the prosperity of the citizens of Tennessee, the nation, and the world. Research areas include agricultural economics and rural communities; agriculture systems and technology; animal health, production, and products; bioenergy, natural resources, environment; food safety, nutrition, and health; plant health, production, and products; family well-being and youth development.

## College of Business

The College of Business (COB) is uniquely poised as a strong, robust, and expanding educational options with the Accelerated and Executive MBA programs. These graduate programs provide convenient and flexible options for working individuals and students taking the next step in management. Preparing students for the corporate environment or entrepreneurship, the COB is positively impacting the entrepreneurial and economic tapestry of Nashville, the State of Tennessee, and the world. The faculty are engaged in conducting applied, discipline-based, and pedagogical research in accounting, business management, economics, finance, and information systems and technology.

## College of Education

The College of Education faculty are engaged in research that examines disparities in education and student learning. They strive for developing, and implementing, innovative models of programs, instruction, and assessment along with integrating technology to influence student learning outcomes; elevating teaching and leading; designing clinical experiences to transform human capital pipeline, developing strategic partnerships; using data to inform program development, and applying human

capital decision making processes; strategies for developing pathways to excellent teaching; and more inclusive models of student academic success that are designed to impact student retention.

## College of Engineering

The College of Engineering faculty are conducting research in nanomaterials, signal and image processing, intelligent control systems, robotics and mechatronics, artificial intelligence, bioinformatics and big data, health monitoring, systems engineering, wireless communication, and cybersecurity across various systems and software. Our engineering programs house Masters and Ph.D. degree opportunities.

## College of Health Sciences

The faculty of the College of Health Sciences, our largest college, are engaged in conducting research that includes speech pathology and audiology, behavioral science approaches to reduce health disparities, obesity, diabetes, and breast cancer prevention and treatment. The COHS is housed in our new 100,000 sq. ft. facility. The college also houses the Tiger Community Rehabilitation Clinic, a student-run occupational and physical therapy clinic.

## College of Liberal Arts

The faculty of the College of Liberal Arts are engaged in conducting research in areas that reflect knowledge and potential of new interdisciplinary fields while continuing work in the traditional academic disciplines at the heart of a university. The research includes studies in geosciences and environmental justice; global perspectives on civil rights and justice issues; African American history, literature, and culture; education in music, history, literature, and language; global perspectives in art; and criminal justice.

## College of Life and Physical Sciences

The Department of Chemistry is dedicated to cutting-edge research spanning environmental science,



cancer, viruses, drug design, the synthesis of novel inorganic materials, and the intricate interactions within various biological systems and membrane constituents. The Department of Biological Sciences, comprising a faculty deeply immersed in cellular and molecular biology, conducts research ranging from the effects of plant extracts on cancer cell growth to exploring the role of D3 receptors in neuronal development, delving into collagen assembly and trafficking, and addressing issues in global change ecology. The Department of Mathematical Sciences hosts faculty members with diverse research interests encompassing applied mathematics, mathematical modeling, functional and numerical analysis, algebra, mathematics education, wavelets, physics, and astronomy. Together, these departments contribute to a vibrant and interdisciplinary research environment at the university.

### College of Public Service

The faculty of the College of Public Service are engaged in conducting research specific to leadership; intergovernmental relations, public

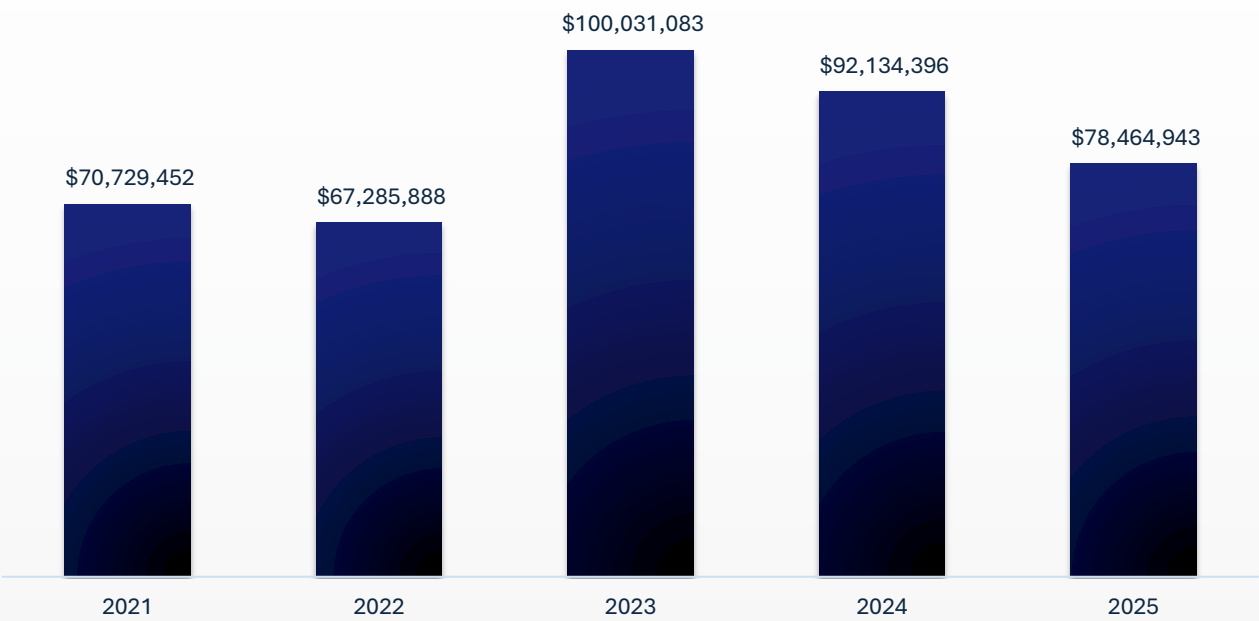
### University Honors College

The University Honors College (UHC) provides an especially rich and challenging set of academic offerings to talented and highly motivated students at Tennessee State University. Through special courses, a vigorous intellectual community, and emphasis on undergraduate research, the Honors College enables students to reach new heights of excellence.




# RESEARCH AWARDS: 2024 - 2025


## Annual Research Awards: Five-Year Results




## High-Impact Funding Highlights



During fiscal year 2025, the University was awarded over \$78 million in grants and contracts, the third highest total in awarded grants and contracts in the past ten years.



Faculty and staff submitted 176 proposals, resulting in 169 awards. The total value of the proposal requests equaled \$201,075,702.

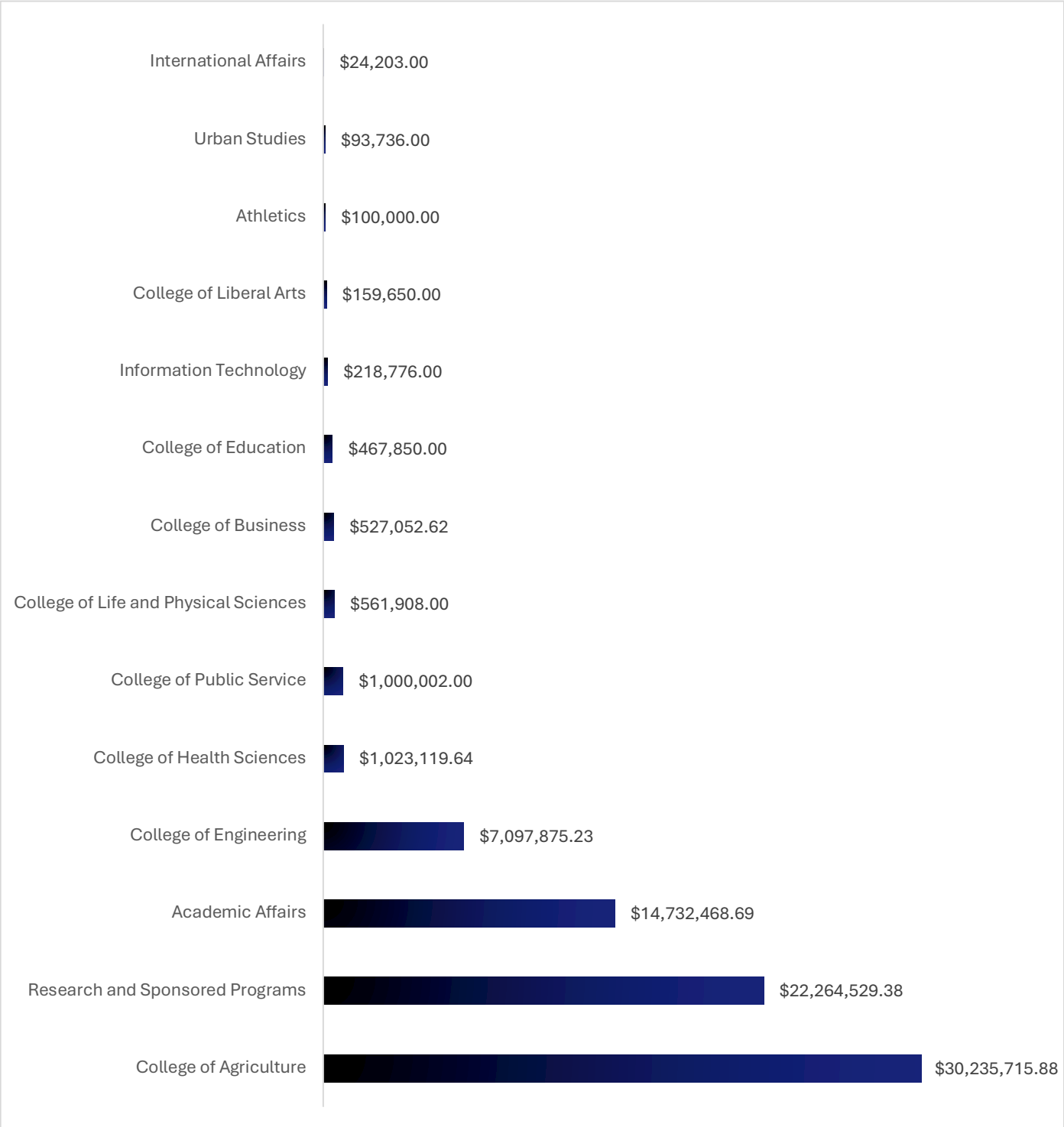


Grants and contracts were funded by 63 federal, state, and private agencies and foundations.



# RESEARCH AWARDS: 2024 - 2025

## 2025 Awards by College, Division, or Center



# FACULTY RESEARCH HIGHLIGHTS

## Research at TSU: Evolving Through Partnerships, Innovation, and Purpose

At Tennessee State University, research is not only about discovery, but also about delivering impact. As the University continues its evolution into a hub of research excellence, its strategic focus on collaborative innovation is producing measurable benefits for communities across Tennessee and beyond. By partnering with corporate leaders like Apple, engaging with government agencies such as the Tennessee Department of Economic and Community Development, and working within national innovation ecosystems, TSU is positioning itself at the intersection of research, workforce transformation, and economic competitiveness.

The University's sponsored research enterprise reflects this forward-thinking approach. From groundbreaking work in digital education and artificial intelligence to real-time transportation safety and open-access learning resources, TSU researchers are developing solutions that meet urgent societal needs, expand economic opportunity, and increase institutional resilience.

### Pioneering Artificial Intelligence in Higher Education: SMART "AI for ALL" Applied Research Center

At the forefront of AI integration in education and workforce training, TSU's SMART Innovation Technology Center continues to break new ground through its **AI for ALL Applied Research Center**. The center advances digital fluency across disciplines, offering research, professional development, and practical training for students, faculty, and employers.



Notable efforts include the **HBCU AI National Summit**, which brought together thought leaders, educators, and innovators to explore the transformative power of AI. The center has also developed original research models such as the **Arrighi Scale**, **ASCEND**, and **P.A.C. It Up** that demonstrate how AI can support real-world teaching, learning, and operational decisions.

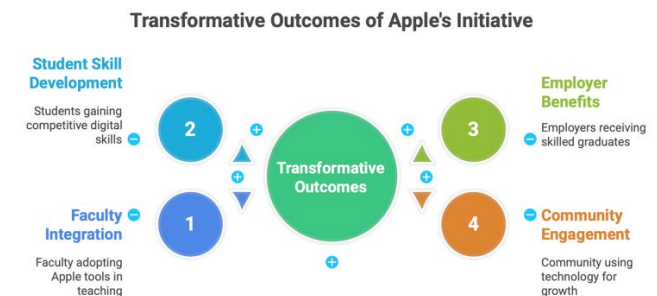
Facilities like the **Academic eSports Lab**, **Virtual Reality Lab**, and the **Sphero and Robotics Coding Lab** give students hands-on access to immersive environments where they can explore the future of work. These labs are more than instructional spaces, they are incubators of innovation, helping TSU and its partners lead the conversation on applied uses of artificial intelligence.

With global reach and local relevance, the SMART Center's AI initiatives prepare TSU stakeholders for the evolving demands of the 21st-century workforce and contribute to the university's national profile as a technology-forward institution.



## National Leadership in Digital Literacy: The HBCU-C<sup>2</sup> SMART Technology Project

With visionary support from Apple, TSU's SMART Innovation Technology Center has become the national leader of the HBCU-C<sup>2</sup>'s **Everyone Can Code** and **Everyone Can Create** programs. Since 2019, the center has impacted more than 3,000 students, faculty, and staff across 54 HBCUs through innovative digital literacy programming.



The program emphasizes creative and technical fluency by training participants to use Apple's suite of tools including Swift Playgrounds for app development and multimedia tools like Keynote, GarageBand, and Pages. The results have been transformative. Students now leave TSU equipped with industry-relevant skills in app development, artificial intelligence, augmented and virtual reality, and digital storytelling competencies in high demand across multiple sectors.

Faculty across HBCUs have incorporated these tools into their pedagogy, creating more engaging and interactive learning environments. Additionally, the initiative has reached community members through workshops that promote lifelong learning and digital equity, positioning TSU as a leader in bridging the digital divide. With Apple's continued support, TSU has developed a scalable model that other institutions nationwide can follow that are advancing innovation, and workforce readiness in the digital economy.

## Promoting Access and Affordability: The HBCU Affordable Learning Solutions Community Portal



Cost remains a major barrier to higher education, particularly at under-resourced institutions. TSU addressed this challenge head-on through the **HBCU Affordable Learning Solutions Community Portal**, supported by the William and Flora Hewlett Foundation. The portal, anchored by TSU's **SMART OER Center**, provides free and curated Open Educational Resources (OER) for faculty and students across a wide range of disciplines.

The portal's standout feature is its **Cultural Collection**, a repository of content that supports teaching and learning through culturally relevant biographies, institutional histories, and academic texts. By drawing on content partnerships with reputable institutions such as **MIT OpenCourseWare** and **MERLOT**, the portal ensures academic quality while expanding access.

Through these resources, TSU empowers faculty to reduce textbook costs and adopt innovative instructional materials. The initiative also strengthens collaboration across the HBCU community and reinforces TSU's leadership in value-centered education reform.

## Innovating Public Safety: The LADDMS Transportation Research Initiative

One of TSU's most ambitious recent partnerships is the **Leveraging Advanced Data to Deliver Multimodal Safety (LADDMS)** project, in collaboration with the Nashville Department of Transportation and Multimodal Infrastructure (NDOT), Vanderbilt University, and the University of Tennessee at Chattanooga.

Led by TSU's Dr. Kamrul Hasan, this multimillion-dollar research initiative uses AI and LiDAR (Light Detection and Ranging) technology to identify near-miss traffic incidents, especially those involving vulnerable road users like pedestrians and cyclists.



Dr. Kamrul Hasan (center) and graduate students at the Stage I success celebration hosted by the City of Nashville.

**Stage I (2023–2025)**, funded at \$2 million, introduced a new method for understanding roadway safety. Using LiDAR sensors, researchers gathered high-resolution data on traffic patterns, vehicle interactions, and pedestrian risk. This data helped NDOT pinpoint dangerous intersections and informed immediate safety interventions aligned with Nashville's Vision Zero goals.

**Stage II (2025–2028)**, backed by a \$10 million investment, will expand the system along the high-risk Nolensville Pike corridor and into underserved neighborhoods in North Nashville. These areas are home to residents who face disproportionate transportation safety risks, and the expanded data collection will allow for more targeted and effective solutions.



Nolensville Pike, a Stage II LADDMS location, shows pedestrian risks.

In addition to enhancing road safety, the project includes a major workforce development component. TSU and its partners are training traffic operations staff and other stakeholders in the use of LiDAR and AI technologies.



The LADDMS project team.

Following the lessons learned from Stage I, collaborations will be vital for community involvement and outreach, ensuring we meet local needs and expectations. Development of new training programs with companies **Nabco** and **Stansell Electric**, along with knowledge dissemination through organizations such as **ITS Tennessee** and **ITS America**, will ensure this research has broad support for its workforce development goals.

### Looking Ahead: Evolution Through Impact

These sponsored research initiatives reflect Tennessee State University's strategic evolution as a leader in collaborative, community-responsive research. Whether increasing access to digital learning, modernizing teaching with AI, making roads safer, or reducing the cost of education, TSU researchers are shaping solutions that matter.

With every new grant, partnership, and breakthrough, the University expands its capacity to drive regional economic development and national competitiveness. These efforts highlight how research at TSU is not just growing, it is evolving.



## RESEARCH AND SPONSORED PROGRAMS STAFF



**Dr. Quincy Quick**  
Associate Vice President and  
Chief Research Officer of Research  
and Sponsored Programs  
[qquick@tnstate.edu](mailto:qquick@tnstate.edu)



**Dr. Rebecca Selove**  
Director of the  
Center for Prevention Research  
[rselove@tnstate.edu](mailto:rselove@tnstate.edu)



**Dr. Kimberly Smith**  
Director of the Center of Excellence for  
Learning Sciences  
[ksmith81@tnstate.edu](mailto:ksmith81@tnstate.edu)



**Reginald Cannon**  
Director of Engagement and Visibility  
[rcannon@tnstate.edu](mailto:rcannon@tnstate.edu)



**Dr. Corinne Vaughn**  
Director of Research Management  
[svaughn@tnstate.edu](mailto:svaughn@tnstate.edu)



**April Falconer**  
Research Specialist  
[afalcone@tnstate.edu](mailto:afalcone@tnstate.edu)



**Barbara Isabell**  
Assistant to the AVP of Research  
[bisabell@tnstate.edu](mailto:bisabell@tnstate.edu)



**Robert Turner**  
Technology Transfer and  
Innovation Manager  
[rturne10@tnstate.edu](mailto:rturne10@tnstate.edu)



**Cheryle Washington**  
Administrative Assistant IV  
[cnixon1@tnstate.edu](mailto:cnixon1@tnstate.edu)

## GRANTS ACCOUNTING STAFF



**Lawanda Johnson**  
Interim Executive Director of Foundation  
[ljohns14@tnstate.edu](mailto:ljohns14@tnstate.edu)



**Grecia Viera**  
Assistant Director of Grants Accounting  
[gviera@tnstate.edu](mailto:gviera@tnstate.edu)



**Marietta Kelley**  
Financial Analyst III  
[mkelley@tnstate.edu](mailto:mkelley@tnstate.edu)



# TENNESSEE

## STATE UNIVERSITY

### DIVISION OF RESEARCH AND SPONSORED PROGRAMS

**3500 John A. Merritt Blvd.  
Nashville, TN 37209-1561**

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#### CONTACT US

[research@tnstate.edu](mailto:research@tnstate.edu)

615-963-7631

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