



RESEARCH DAY 2026

April 2, 2026

CARVER A. RANDLE AUDITORIUM
W.A. BUTTS SOCIAL SCIENCE



OFFICE OF
ACADEMIC AFFAIRS

RESEARCH DAY 2026

APRIL 2, 2026 | 11 AM
CARVER A. RANDLE AUDITORIUM
W.A. BUTTS SOCIAL SCIENCE BUILDING

GREETINGS

POSTER SHOWCASE
11 am – 12 noon

AWARDS AND CLOSING REMARKS
12 noon

PRESENTATIONS

ECONOMICS

Author(s):

Preston Brantley and Khalleecia Lee

Title

Access to Excess: Turning Surplus Inventory into Sustainable Opportunities

Abstract

AccessToExcess is a digital platform designed to address the growing challenge of retail waste while improving consumer access to affordable products. By connecting consumers with retailers offering discounted excess inventory, the platform creates a mutually beneficial system that reduces surplus goods and enhances purchasing power. Leveraging real-time data analytics and location-based technology, AccessToExcess enables businesses to dynamically adjust pricing and efficiently manage unsold inventory, allowing retailers to recover value from products that might otherwise be discarded. For consumers, the platform provides a convenient way to discover nearby deals on everyday items, promoting cost savings without compromising quality. Additionally, it encourages more sustainable consumption by extending product lifecycles and reducing unnecessary waste. By reducing the amount of usable goods sent to landfills, AccessToExcess helps lower greenhouse gas emissions and overall environmental impact. Integrating technology, sustainability, and economic efficiency allows AccessToExcess to offer a forward-thinking solution that benefits businesses, consumers, and communities while promoting a more sustainable retail ecosystem.

Author(s):

Alyshia Pittman and Akiriah Nesbit

Title

Socioeconomic and Demographic Drivers of Household Income in the Mississippi Delta Region

Abstract

This study examines the determinants of Median Household Income (MHI) using a multiple linear regression framework based on 5 years data for 18 counties of Mississippi Delta. For this purpose, a secondary data sets are utilized for the period of 2021-2025 and sourced from U.S. Census Bureau. The model incorporates 8 key socioeconomic variables, including education share (EDU_SHAREHI), enrollment (ENROLLMNT), employment growth (EMPOLY_GROWTH), investment, population age (POP_AGE), education and health social spending (EHSS), home ownership (HOME_OWNOR), and poverty and socioeconomic status (PSES). The results reveal a strong overall model fit, with an R-squared of 0.958 and an adjusted R-squared of 0.921, indicating that the explanatory variables account for a substantial proportion of variation in MHI.

Among the predictors, employment growth and home ownership exhibit positive and statistically significant effects on household income, suggesting that labor market expansion and asset ownership play a crucial role in enhancing income levels. In contrast, PSES shows a strong negative and significant relationship, indicating that socioeconomic disadvantages significantly reduce median income. Other variables, such as education share, enrollment, investment, population age, and EHSS, do not show statistically significant effects, although their coefficients provide insights into potential structural relationships.

The model is statistically significant overall, as indicated by the F-statistic (25.61, $p < 0.01$). However, the Durbin-Watson statistics (1.53) suggests mild autocorrelation, warranting further diagnostic testing. The findings highlight the importance of employment opportunities and home ownership in improving income levels while underscoring the adverse impact of socioeconomic inequality. The study provides useful implications for policymakers aiming to enhance income distribution and economic well-being.

CRIMINAL JUSTICE

Author(s):

Raynia Greer

Title

Guilty Before the Evidence: The Influence of Defendant Preconceptions on Jury Decision-Making

Abstract

This study examines how juror stereotypes and first impressions influence decision-making in criminal trials, with particular attention to the formation of pre-evidentiary judgments about defendants. While the legal system assumes that jurors evaluate cases based on evidence presented in court, this research investigates the extent to which implicit biases shape verdicts prior to evidence review.

The study focuses on independent variables, including juror preconceptions such as stereotypes related to race, appearance, socioeconomic status, and demeanor, as well as initial impressions formed during defendant exposure. The dependent variables include jury decision-making outcomes, specifically verdict choice (guilty or not guilty), confidence in verdict, and interpretation of ambiguous evidence. This study will use a quantitative experimental design; participants will be presented with controlled mock trial scenarios in which defendant characteristics. Data will be collected through surveys and experimental instruments measuring pretrial impressions, bias indicators, and final verdict decisions.

Author(s):

Michelle Diaz

Title

The Impact of Immigration Enforcement Policies on Hispanic Students, Families on Educational Outcomes on American Communities

Abstract

This study examines how immigration enforcement policies affect American communities, with a particular focus on students, families, and schools, particularly k-12. While immigration is often framed in terms of law and national security, this research centers the broader social and educational consequences of enforcement practices. The purpose of the study is to analyze how heighten immigration enforcement influences family stability, student well-being, and educational outcomes in communities with significant Hispanic populations. This study will employ qualitative design. The independent variable is the intensity of immigration enforcement policies, while the dependent variable include family stability, student mental health, school attendance, and academic engagement.

Author(s):

Monterrio J. Johnson

Title

The Impact of Criminal Justice Programming, Pedagogical Practices and Institutional Support at HBCUs

Abstract

The study examines how instructional practices, mentoring relationships, curriculum design, and institutional supports within criminal justice programs shape students' academic success, professional identity development, and civic engagement. The study will employ a mixed-methods design across HBCUs.

COMPUTER SCIENCE APPS

Author(s):

Arqawan Noori

Title

Gradpath – Academic Advising System

Abstract

GradPath is a full-stack academic advising and degree planning platform designed to help students efficiently build and manage their semester schedules. It addresses key challenges such as prerequisite tracking, course conflicts, and limited advisor interaction. Built using React.js and Tailwind CSS for the frontend and Node.js with Express.js for the backend, the system uses PostgreSQL for secure data storage. GradPath features a drag-and-drop interface for course planning, automatic prerequisite validation, and real-time conflict detection to prevent invalid schedules. It also includes an advisor module that allows feedback and approval through statuses like “Draft” and “Approved.” Although the platform currently relies on rule-based logic, it is designed to support future AI-driven recommendations. Overall, GradPath improves the academic planning experience by combining usability, accuracy, and collaboration.

Author(s):

Teniola Oluwaseyitan

Title

PeerConnect: Optimizing Peer Tutoring with Predictive Analytics and Intelligent Matching

Abstract

PeerConnect is an advanced mobile application designed to enhance academic support and peer led learning by connecting students with compatible tutors based on their strengths, learning needs, and performance data. Addressing the challenges students face in finding effective academic assistance, the platform leverages predictive analytics and intelligent matching algorithms to recommend the most suitable tutors, optimize session scheduling, and monitor student progress, creating a personalized and data-driven learning experience.

The application incorporates features such as user registration, detailed tutor profiles with performance statistics, progress tracking dashboards, session scheduling with conflict detection, and AI-driven recommendations for study materials and tutors. Built as an iOS application using Swift with a Python-powered backend and MySQL database, PeerConnect prioritizes accessibility, user experience, and responsive design, making it suitable for students across diverse academic disciplines.

By integrating mathematical concepts such as weighted scoring, regression analysis, graph-based network modeling, and predictive probability, PeerConnect not only strengthens the peer tutoring process but also provides measurable insights into student performance and learning outcomes. The platform fosters a culture of collaborative learning, academic improvement, and knowledge sharing, offering a structured, reliable, and scalable alternative to informal or traditional tutoring services.

PeerConnect ultimately aims to enhance student academic performance, engagement, and retention by providing a robust, technology-driven peer support system. Future development may expand AI-driven analytics, subject coverage, and integration with institutional learning management systems, highlighting the transformative potential of math-informed, data-driven educational technology in higher education.

Author(s):

Chante Ray

Title

Decal Management System

Abstract

The Decal Management System is designed to modernize and streamline the process of vehicle decal registration within a university environment. Some universities currently rely on manual or paper-based systems for issuing parking decals, leading to delays and administrative burdens. This project introduces a web-based application that enables students, faculty, and staff to apply for, pay for, and manage vehicle decals securely online. This application reduces paperwork, improves accessibility, and enhances administrative efficiency while maintaining strong data integrity and security standards.

Author(s):

Shovkat Zeynalli

Title

Textbook Adoption Management System: A Role-Based Web Application for Streaming Academic Workflows

Abstract

The Textbook Adoption Management System is a full-stack web application designed to streamline and modernize the process of textbook selection within academic institutions. In many universities, textbook adoption is handled through manual or fragmented systems, which often lead to delays, miscommunication, and inefficiencies between instructors, departments, and bookstores. This project addresses these challenges by providing a centralized, role-based platform that improves coordination and transparency.

The system supports three primary user roles: Instructor, Head of Department (HoD), and Bookstore staff. Instructors can create and submit textbook adoption forms for their courses, including detailed information such as book title, author, edition, and required quantity. HoDs are responsible for reviewing submitted forms and can approve or reject requests based on departmental needs. Once approved, textbook data becomes accessible to the bookstore, allowing for efficient preparation and inventory planning. The application is built using React.js for the frontend, Node.js with Express for the backend, and MySQL for data storage, with bcrypt used for secure authentication. Role-based access control ensures that users can only access relevant data, enhancing both security and usability.

COMPUTER SCIENCE

Author(s):

Eyimofe Ajagunna, Blessed Kutyauroipo and LeDarius Robinson

Title

Detecting Hidden Multiprotocol Label Switching Tunnels (MPLS) in Networks

Abstract

This research focuses on developing a reliable methodology for detecting hidden MPLS (Multiprotocol Label Switching) tunnels using active network probing. Our proposed algorithm combines geographic anomalies, RTT behavior, hostname patterns, backbone routing characteristics to distinguish MPLS tunnels from ordinary routing behaviors such as load balancing. Furthermore, our detection pipeline is implemented to automate tunnel identification, estimate tunnel boundaries, and visualize hop-level behavior. The purpose of this research is to create an accurate, reproducible framework for uncovering concealed MPLS

structures in modern networks, enabling improved transparency, routing analysis, and network measurement accuracy.

Author(s):
Terrell Booker

Title
Filling in the Stars – Guessing Missing Hops in Traceroute

Abstract
Traceroute is widely used to map network paths, but its reliance on ICMP results in many incomplete traces, often showing “*” for missing hops. This project explores whether multi-protocol probing, using ICMP, UDP, and TCP, can uncover hops that conventional traceroute cannot detect. We collected three traceroutes to the same destination and developed a Python application that parses, aligns, and compares these outputs. Whenever ICMP returned a missing hop, the program substituted the corresponding UDP or TCP response, creating a more complete composite route. Our preliminary results indicate that several routers respond selectively depending on the protocol used and thus confirm that protocol-level filtering significantly affects path visibility. By illustrating the merit of using multiple types of probes to obtain more accurate network measurements, this work provides researchers and network analysts with an automated tool to facilitate the process.

Author(s):
Bakri Diyaolu, Adin Lindsey and Jeremiah Adderley

Title
Budget – Aware Tracerouting

Abstract
Traditional traceroute tools send a fixed number of probes per hop, leading to redundant measurements and inefficient use of network resources. This research introduces a budget-aware traceroute system (BAT) designed to optimize probing efficiency while preserving accurate path discovery. Using Scamper as the probing engine, BAT dynamically allocates probe “credits” across hops based on per-hop confidence levels. This work highlights the potential for adaptive network measurement systems that balance precision, responsiveness, and bandwidth efficiency in large-scale Internet topology mapping.

Author(s):
Anthony Nwafor, Madison Conley and Tristan Connor Thomas

Title
Detecting and Labeling Hidden MPLS Tunnels

Abstract
Standard traceroute often yields inaccurate Internet maps due to MPLS Tunnels hiding the true path, but this work improves a framework to detect and classify these tunnels—categorized as EXPLICIT, IMPLICIT, OPAQUE, or INVISIBLE—by utilizing two key features: the ttl-propagate status and RFC 4950 extensions. The framework uses the scamper tool to gather essential metadata like the ttlpropagate value and applies three techniques—Quoted-TTL Signature, Opaque Tunnel Estimation, and Invisible Tunnel Inference—to accurately identify and label all tunnel types.

Author(s):
Malick Mhando

Title
Computer Simulation of Snowflakes

Abstract
Snowflakes are a natural phenomenon in the north. They are beautiful. They have many applications within the industry. The question is, what is the mathematics behind the structure of snowflakes? Can we use the knowledge of trigonometry and geometry to implement this? We will attempt to simulate the structure of snowflakes using Python and explore the mathematics.

ENGINEERING TECHNOLOGY

Author(s):
Hailey Akers

Title
Parametric Analysis of Brick Geometry and Mix Design Effect on Masonry Mechanical Performance

Abstract
Masonry remains a widely used structural system in housing construction, making the optimization of both mix design and internal geometry important for improving structural performance and reducing material usage. This study examines how brick geometry and water-to-cement (w/c) ratio jointly influence the mechanical behavior of masonry units using parametric finite element simulations in ABAQUS. Four geometric configurations solid, hollow, ribbed, and honeycomb are evaluated across five w/c ratios (0.40, 0.45, 0.50, 0.55, 0.60), forming a 20-case factorial design. Variations in w/c ratio are incorporated by updating key material properties, including density, Young’s Modulus, and compressive strength, using published empirical relationships. All simulations assume a homogeneous, isotropic, linear-elastic material model to represent early-stage compressive behavior. Each configuration is subjected to standardized compression and bending loads, and the resulting von Mises stress, deformation, and strength-to-weight performance are quantified. Simulated trends are compared with experimental data from the literature to assess the reasonableness of the modeling assumptions. The study aims to identify geometry-mix combinations that balance structural adequacy with material efficiency and to provide a foundational dataset for early-stage design of improved masonry units for residential construction.

Author(s):
Jeremiah Clemmons

Title
Engine Design and Gasoline Spray Behavior: Effects of Injection Pressure and Fuel Temperature

Abstract
This project presented a preliminary investigation of engine design and gasoline spray behavior. A model internal combustion engine was first developed using computer-aided design to illustrate the geometry and function of major engine components such as the piston, cylinder, connecting rod, and crankshaft. Selected components were fabricated using 3D printing to provide a physical model for improved visualization of engine configuration and assembly. In addition, the four stroke engine cycle was introduced to support understanding of the fundamental stages of engine operation.

The study also examined the effect of injection pressure and temperature on gasoline spray characteristics. Particular attention was given to spray penetration, atomization, and fuel-air mixing, since these features influence the overall fuel injection process. The spray behavior was evaluated over an injection pressure range of 50 to 350 bar and a temperature range of -7°C to 60°C. Higher injection pressure increased spray penetration and improved atomization, while elevated temperature altered spray structure and enhanced fuel-air mixing. The findings highlight the role of injection parameters in gasoline spray behavior and provide an introductory basis for future work in fuel injection and combustion studies.

Author(s):
Ariana Cobb

Title
Enhancing CAD Rendering for Interior Design Communication

Abstract

Interior design communication depends heavily on effective visualization; however, many clients struggle to interpret raw CAD drawings or basic SketchUp models because they lack emotional, atmospheric, and sensory detail. Technical representations are often difficult to understand when they are not supported by realistic textures, lighting, or expressive visual cues, and CAD drawings alone can limit client comprehension because the visuals do not communicate feeling or atmosphere. This project addresses that gap by enhancing CAD and SketchUp outputs through Adobe Photoshop to create renderings that are both visually accurate and emotionally engaging. Beginning with a 2D AutoCAD layout of a 1,000 sq. ft. interior space, the design was developed in SketchUp to extrude walls, apply structural refinement, and place furniture. A mood board guided material and atmosphere decisions, followed by Photoshop enhancements including graphic overlays, lighting adjustments, color sampling, and generative fill. Emotional design elements help clients connect more clearly with the visual direction of a space and improve engagement. The purpose of this project is to strengthen client understanding and decision-making by presenting interior designs that communicate both technical accuracy and intended emotional characteristics of the space.

Author(s):
Kevin Ervin

Title
A Prototype Design and Feasibility Study of an Off-Grid Solar-Powered LED Road Sign Attachment

Abstract

This project presents the design, construction, and preliminary evaluation of a stand-alone solar-powered LED attachment intended to enhance road sign visibility under low-light conditions. The system integrates four 5 V solar panels, a 12 V rechargeable battery, a solar charge controller with automatic dusk-to-dawn operation, and a 12 V LED strip mounted around the sign perimeter. The objective was to develop a low-cost off-grid lighting solution capable of charging during daylight hours and operating autonomously at night without external electrical infrastructure. Prototype testing was conducted under outdoor sunny and cloudy conditions by monitoring solar-panel voltage, battery charging behavior, and LED runtime. Under sunny conditions, the battery voltage increased from 11.2 V to 13.0 V over approximately 10 hours, and the fully charged system sustained LED illumination for up to 24 hours. Under cloudy conditions, the charging rate was reduced, with battery voltage increasing from 11.2 V to 12.1 V over the same period, indicating limited energy recovery and reduced nighttime endurance. The results demonstrate the feasibility of using a compact solar-battery-LED configuration for autonomous road-sign illumination. However, the present study should be interpreted as a prototype feasibility assessment rather than a full field-performance validation, and future work should include photometric measurements, long-term outdoor durability testing, and visibility-based performance evaluation.

Author(s):
Tevin King

Title
Design and Development of a Low-Cost Arduino-Based Dual-Axis Solar Tracking System

Abstract

The electrical output of photovoltaic systems is highly sensitive to panel orientation relative to incident solar radiation. Conventional fixed panels are limited because they cannot continuously align with the sun's changing position, which reduces solar capture over the course of the day. This study presents the development of a low-cost dual-axis solar tracking prototype designed to improve panel alignment through real-time light-based control. The system integrates an Arduino Uno microcontroller, four LDR sensors, two servo motors, and a 3D-printed mechanical structure designed in Autodesk Inventor. A control routine was implemented to process sensor signals and actuate the panel in both azimuth and elevation directions. Prototype testing verified smooth two-axis motion and appropriate response to changing light conditions, demonstrating the functional capability of the tracking mechanism. Initial power observations indicated stable operation during charging and load support tests. While the present work does not yet provide a full quantitative comparison of energy gain relative to fixed-panel operation, it establishes a practical and accessible framework for low-cost solar tracking. The study contributes a prototype-level design suitable for further optimization, outdoor validation, and comparative efficiency assessment.

Author(s):
Blessed Kutyaupipo

Title
Developing and Building an Occupancy-Aware HVAC Control System

Abstract

Heating, ventilation, and air conditioning (HVAC) systems are essential for occupancy comfortability inside a building. However, not only is it very expensive to run the systems, but it also makes up around 35% of a building's electrical use. HVAC can end up costing around 40-50% of total utility bills annually, increasing an extra 10% in summer. While research has already been done on an occupancy-based HVAC system, there has been limited effort to improve, design, or implement the idea into existing buildings. Therefore, this project aims to design and implement an HVAC system that adjusts temperature and airflow based on room occupancy and environmental conditions. The proposed system uses a Raspberry Pi microcontroller to coordinate data between sensors and the HVAC system. A magnetic door sensor collects the numerical data of occupants entering the room and leaving the room, while the temperature sensor records environmental conditions. The Raspberry Pi processes this information and sends regulation commands to the thermostat, which adjusts the HVAC system's airflow to maintain comfortable indoor conditions. This system enables real-time adjustment of airflow and temperature to improve efficiency. Implementing such an Occupancy-Aware HVAC system can reduce energy consumption by approximately 17-18% (Zhang, 2013). While costs and savings vary by region and climate, occupancy comfortability will remain the same, making this system a practical and sustainable solution for reducing building energy use.

MASS COMMUNICATIONS

Author(s):
Allison Howell

Title

Examining the Effects of DEI rollbacks on the representation of women and minority women in public relations leadership: a qualitative content analysis

Abstract

This research looks at how diversity, equity, and inclusion (DEI) rollbacks are presented in professional workplace rhetoric and explores what this means for the representation of women and minority women in public relations leadership. Women make up many public relations employees, but leadership roles remain disproportionately occupied by men, and minority women are affected by additional obstacles in terms of race, gender, mentorship access, and advancement opportunities. The recent changes in political, legal, and organizational trends have caused many companies to downsize DEI initiatives or to redefine DEI initiatives, prompting the future of diversity at the top of the leadership pipeline to come under question. This study used qualitative content analysis and examined ten professional articles from 2020 to 2025 from SHRM (the Society for Human Resource Management), HBR (Harvard Business Review), and selected trade publications, among others. Articles were coded with themes surrounding DEI representation, tone and framing, policy reversal effects, visibility, and organizational responses. DEI initiatives are not being eliminated but reframed as concepts of culture, fairness, and talent strategy, according to the findings. Political and legal pressures affect the way organizations speak about DEI, using indirect messages. These changes can lead to less exposure and accountability for leadership diversity initiatives, which may curtail women and minority women from advancing within public relations. This research emphasizes the need for sustained focus on organized inclusion strategies to help implement structured systems of inclusion and fair leadership development.

Author(s):
Shakyla Johnson

Title

The Impact of Communication Technology on Senior Adults

Abstract

This research explores the impact of communication technology on older adults in terms of wages, automation, and the need for guidance on digital communications. The study utilized a qualitative content analysis method to systematically identify patterns present in the reviewed literature, organizational documents, and narratives provided by participants. Content analysis was instrumental in helping identify recurring themes regarding how seniors communicate and engage with technology, including accessibility, confidence, financial implications, and adapting to use of automation. While some quantitative research supported the study's broader perspective (context), as well as its results, qualitative content analysis was the primary means used by this study to understand how seniors interact with technology and how their use of those technologies impacts their everyday lives. In addition to examining the content data across multiple sources, the objective of this study was to provide a comprehensive understanding of the technological challenges associated with older adults as well as their need for assistance using those technologies to communicate digitally; therefore, advocacy for improving and developing digital communication support for senior adults is needed as there will be an increasing reliance on automated systems.

Author(s):
Jakaylah Redmond

Title

The Role of Media in the Incarceration of Black Men

Abstract

This study explores how media coverage in the Mississippi Delta reinforces harmful and persistent narratives about Black men, related to crime and incarceration. Using a qualitative content analysis of twenty news articles published between 2010 and 2025, the research identifies three main themes in the portrayal of Black men: crime-focused identity framing, racialized danger narratives, and systemic violence and institutional harm. These patterns consistently appeared across local newspapers, regional television outlets, and national sources reporting Delta-related incidents. Statistical data of incarceration rates and media practices, including racial disparities in mugshot usage and imprisonment rates, further support the thematic findings. Overall, the results show that Delta media often perpetuates stereotypes by depicting Black men mainly through criminal accusations, fear-based language, and punitive contexts. These portrayals influence public perception and contribute to the broader system of mass incarceration affecting Black men in Mississippi. The findings highlight the importance of questioning and challenging media narratives that normalize unequal treatment and misrepresentation.

SOCIAL WORK

Author(s):
Tren'Derryious Byest

Title

Transforming Kinship Care in Mississippi Through First Family Prevention Service Act

Abstract

The Family First Prevention Services Act (FFPSA) represents a major shift in U.S. child welfare policy by prioritizing prevention services and kinship-based placements to reduce reliance on foster care. This study evaluates FFPSA implementation within Mississippi, focusing on outcomes for kinship caregivers. Using a mixed-methods design, the study combines administrative data with qualitative interviews to examine service access, caregiver burden, and child placement stability.

FFPSA permits states to utilize Title IV-E funding for evidence-based prevention services, including mental health treatment, substance use services, parenting programs, and kinship navigator supports (U.S. Department of Health & Human Services [HHS], 2018). In Mississippi, kinship care is widely used; however, caregivers often experience financial strain and limited access to services, particularly in rural areas (Human Services Research Institute [HSRI], 2023).

Findings are expected to demonstrate that FFPSA-supported services improve caregiver well-being and placement stability while reducing foster care entry. However, service gaps and structural barriers may limit effectiveness. This study highlights the need for strengthened policy implementation to better support kinship families and improve child welfare outcomes in Mississippi.

RESEARCH DAY 2026

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