Victoria Love Franklin, PSM, CPT

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DOCTORAL RESEARCHER · DATA SCIENTIST · GEOSPATIAL SCIENTIST · PEER-REVIEWED PUBLISHED SCIENTIST

Experience across local, state, and federal missions.

My work spans local government, national laboratories, federal research, and academia. Across all of it, I use data, geospatial analytics, artificial intelligence, and cybersecurity to support public service, protect critical infrastructure, and turn complex information into decisions people can use.

Ph.D. Student

Data Science · Nuclear Cybersecurity, expected 2027

Local to Federal

Metro Nashville & Davidson County
U.S. Department of Energy
U.S. Department of Defense
U.S. Forest Service
U.S. Department of the Navy

5 Federal Labs

Idaho National Laboratory (INL)
Savannah River National Laboratory (SRNL)
Oak Ridge National Laboratory (ORNL · ORISE)
U.S. Naval Research Laboratory (NRL · ONR)
U.S. Air Force School of Aerospace Medicine (USAFSAM)

Nashville, TN

Home base

Professional experience

Government, national laboratory, research, and industry roles, most recent first.

Oct – Dec 2026

FEDERAL LABORATORY

NREIP Fall Engagement Participant

U.S. Naval Research Laboratory, Washington, DC (virtual) · Office of Naval Research · Naval STEM Coordination Office

- Selected for the Naval Research Enterprise Internship Program (NREIP) Fall Engagement, a 40-hour Department of the Navy research engagement (October 1 – December 31, 2026) that includes at least 10 hours of mentoring with Navy STEM professionals.

Data Visualization · Human–Data Interaction · Situation Awareness · 3D Simulation · User Research

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Sep – Nov 2026

PUBLIC SERVICE

Data Analytics & Technology Fellow

Metropolitan Government of Nashville & Davidson County · Register of Deeds

Project Lead · Data Analyst · Project Coordinator & IT Support

Supporting the Register of Deeds Office's technology modernization by analyzing operational data, building visualizations, and turning complex information into insights that improve decisions and public service.

- **Project Lead:** leading the design of a new public-facing Register of Deeds website and interactive data portal that opens property-recording information and office performance data to residents.
- **Data Analyst:** analyzing operational and public-records data to find trends, performance indicators, and process improvements, and building interactive Tableau dashboards on property transfers, recording volumes, processing times, and digital-service use.
- Cleaning, validating, and managing datasets to improve reporting accuracy, and developing GIS-enabled property analytics with ZIP-code mapping and geographic filtering.
- Working with fellows, office staff, and leadership to interpret findings and produce reports, dashboards, and written narratives for technical and non-technical audiences.
- **Project Coordinator & IT Support:** supporting technology infrastructure and digital modernization projects, researching emerging government technology and best practices, and helping departments define reporting needs.

Government Technology · Tableau · Business Intelligence · Performance Measurement · Web Development · GIS · Open Data · IT Support

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Jul – Sep 2026

NATIONAL LABORATORY

Post-PhD Candidacy Technical Intern, Nuclear Cybersecurity

Idaho National Laboratory · Material Minimization, Security & International Safeguards

- Built and readied secure cyber-physical training infrastructure, migrating and configuring virtual machines in Proxmox across roughly 25 workstations and technical assets.
- Conducted vulnerability scanning, asset inventories, and intrusion-detection monitoring for ICS/OT training environments, and integrated HMI, PLC, SCADA, and

biometric access systems.

- Updated International Atomic Energy Agency (IAEA) cybersecurity training materials and presented to an international nuclear-security audience.

Nuclear Cybersecurity · ICS/OT · Vulnerability Assessment · Proxmox · Kali Linux · Docker

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2026

RESEARCH TRAINING

mNGS Wet-Lab & Dry-Lab Research Trainee

Chan Zuckerberg Biohub · Meharry Medical College

- Completed intensive training in metagenomic next-generation sequencing, pathogen surveillance, bioinformatics workflows, and environmental pathogen detection.

Metagenomics · Next-Generation Sequencing · Bioinformatics · CZ ID

2025 – 2026

RESEARCH TRAINING

SHIFT Scholar

NIH-Supported Biomedical Workforce Development Program · Meharry Medical College

- Selected for a nationally recognized, highly competitive professional development program; trained in project management, budgeting, and scientific leadership for biomedical research careers. Certificate of Achievement.

Scientific Leadership · Project Management · Budgeting

Jul 2025 – Jan 2026

NATIONAL LABORATORY

CASPER Scholar & DOE Research Scholar, Energy Systems & Climate Resilience

U.S. Department of Energy · Savannah River National Laboratory · Meharry Medical College

- Built predictive machine-learning models for wildfire risk and power-outage likelihood, and an AI-enabled geospatial framework to find gaps in grid outage data.
- Designed a RAG-enabled digital twin that brings together geospatial intelligence, climate drivers, and grid-resilience analytics.
- Engineered GIS-AI overlays combining outage forecasts, biodiversity hotspots, and environmental-justice indicators.
- Developed GridAI™, a geospatial research platform analyzing energy disruption, social vulnerability, and environmental-justice patterns; its multi-scale California census-tract and county analyses informed the accepted SEGDA paper (EAI SmartGIFT 2026).

Grid Resilience · Wildfire Risk · Digital Twins · RAG · Machine Learning

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Dec 2024 – Dec 2025

FEDERAL LABORATORY

Genomic Epidemiology Fellow (ORISE)

U.S. Department of Defense · U.S. Air Force School of Aerospace Medicine · ORISE / Oak Ridge National Laboratory

- Integrated wastewater, genomic, epidemiological, and clinical data to support infectious-disease biosurveillance and early warning.
- Developed interactive data and visualization approaches combining wastewater surveillance, genomic sequencing, variant intelligence, and geography for decision support.
- Built machine-learning, statistical, and geospatial analytics to detect surveillance trends and support forecasting.

Biosurveillance | Genomic Epidemiology | Machine Learning | GIS | Dashboards

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2024 – Present

ACADEMIC RESEARCH

Ph.D. Student / Doctoral Research Scholar

SACS Cybersecurity Research Center · School of Applied Computational Sciences, Meharry Medical College

Dissertation Research · Data Science, Nuclear Cybersecurity Concentration

- Developing Nuclear Sentinel AI, an explainable, AI-enabled digital-twin framework for cyber-physical risk assessment and resilience in operational technology.
- Designing multimodal machine-learning methods that combine control-system activity, sensor measurements, and digital-twin context to detect abnormal behavior.
- Publishing and presenting research, and mentoring graduate and undergraduate researchers.

Python | AI/ML | Digital Twins | Explainable AI | Anomaly Detection

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May 2022 – Dec 2023

FEDERAL RESEARCH

ORISE GIS Forestry Research Fellow

U.S. Forest Service · U.S. Department of Energy · Oak Ridge National Laboratory

- Used GIS, remote sensing, and Google Earth Engine for biomass assessment, carbon-sequestration analysis, and ecosystem valuation.
- Mapped timber mills and forest resources, and analyzed biomass and canopy coverage for carbon-sequestration planning.
- Analyzed satellite data to estimate logging-residue availability and evaluate woody biomass-to-energy opportunities.

Google Earth Engine | Remote Sensing | GeoPandas | Rasterio

2021

PUBLIC SERVICE

Policy Fellow, Urban Leaders Fellowship

Metro Nashville Public Schools

- Co-authored the Metro Nashville Public Schools COVID-19 school reopening strategy, analyzing epidemiological indicators and community transmission trends.
- Turned research and community considerations into evidence-based recommendations for education leaders.

Policy Analysis | Education Policy | Evidence-Based Decisions

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2020

INDUSTRY

Data Science Research Intern

Dell Technologies

- Analyzed enterprise sales-performance data to identify trends and support business-intelligence reporting.

Business Intelligence | Enterprise Analytics

2019

INDUSTRY

Business Data Analyst (Contractor)

Google Data Center · DB Schenker

- Built operational reporting with Google BigQuery, SQL, Salesforce, and Excel, and standardized reporting workflows and data-quality checks.

SQL | BigQuery | Data Quality | Reporting

Summer 2018

ACADEMIC RESEARCH

Robert Wood Johnson Foundation Public Health Research Intern

Meharry Medical College

- Researched under Dr. Green Ekadi, Professor, School of Graduate Studies and Research: “Are Asymmetric Patterns in the Built Environments of Child Care Centers in Davidson County, TN, Associated with Asymmetric Child Care Quality Outcomes?”
- Compiled ZIP-code data on child care centers, trees, hospitals, clinics, schools, parks, and recreation centers, plus Census indicators for unemployment, overcrowding, car access, and homeownership.
- Contributed to the Childcare Centers Built Environment Index (BEI) report using GIS and spatial analysis.

Spatial Epidemiology | Health Equity | GIS

2017 – 2018

ACADEMIC RESEARCH

GIS Graduate Research Assistant

Tennessee State University

- Quantified urban-forest ecosystem services and carbon sequestration with GIS, remote sensing, and i-Tree, and presented the work at the USGIF GEOINTegration Summit.

Remote Sensing · Urban Forestry · Ecosystem Services

Where it started

Before data science, I spent more than a decade in healthcare operations, billing, and benefits, which is where I first saw how systems shape people's lives.

2015 – 2017	**Coordination of Benefits Coordinator** OPTUM · UnitedHealthcare
2012 – 2015	**Senior Supplemental Insurance Customer Service Representative** Aetna
2007 – 2011	**Project Manager, Third-Party Medicaid Billing Claims** Perot Systems (formerly ARS National Services)
2005 – 2007	**Medical Biller and Coder** MRI Necessities

Research approach

The questions that guide my research.

My research asks how data, AI, and geospatial intelligence can make critical systems safer, healthier, and more equitable, and how to keep those tools explainable to the people who rely on them.

Across nuclear cybersecurity, wastewater genomic surveillance, and energy resilience, I build methods that are transparent, reproducible, and grounded in community impact: explainable AI for operational technology, geospatial analysis of who is covered and who is missed, and decision-support tools that leaders and the public can actually use.

01
How can AI detect threats to critical infrastructure, and explain why?

02
Which communities does public-health surveillance reach, and which does it miss?

03
What can wastewater, genomic, and geospatial data reveal before a crisis is visible?

04
How do power outages and climate hazards fall unevenly across communities?

05

How can research become tools that leaders and the public can actually use?

> *I believe there is strength in knowing who you are while remaining graceful enough to continue learning.*

Research & publications

Work at the intersection of AI, cybersecurity, critical infrastructure, geospatial analytics, and public health.

My research brings together artificial intelligence, cyberinfrastructure, digital twins, geospatial intelligence, genomics, and environmental health analytics to strengthen *public health preparedness, critical infrastructure resilience, and national security.*

RESEARCH AREA 01

AI, Digital Twins & Nuclear Cybersecurity

AI-enabled digital-twin ecosystems for operational technology security, cyber-physical infrastructure protection, cyber risk assessment, and resilience of critical infrastructure.

RESEARCH AREA 02

Genomic Epidemiology & Biosurveillance

Integrating wastewater, environmental, genomic, and public health data for infectious-disease surveillance and early warning, backed by wet-lab and dry-lab metagenomics training.

RESEARCH AREA 03

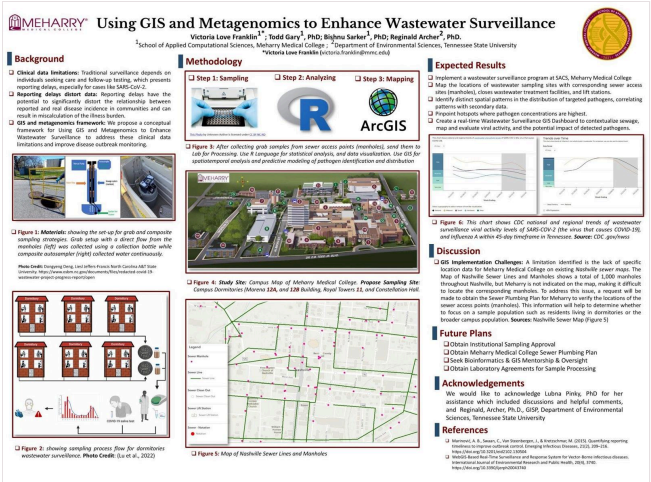
Climate Resilience, Environmental Justice & Energy Systems

How energy systems, infrastructure vulnerability, environmental burden, and social determinants of health connect, including outage-burden modeling and resilience planning.

RESEARCH AREA 04

Geospatial Public Health & Ecosystem Analytics

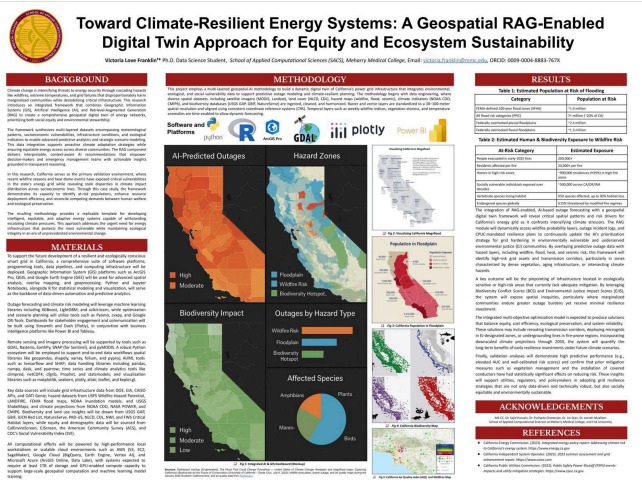
Spatial epidemiology, built-environment and health-disparities research, urban forestry, carbon sequestration, and ecosystem valuation with GIS, remote sensing, and Google Earth Engine.



2025 · 1ST PLACE

Using GIS and Metagenomics to Enhance Wastewater Surveillance

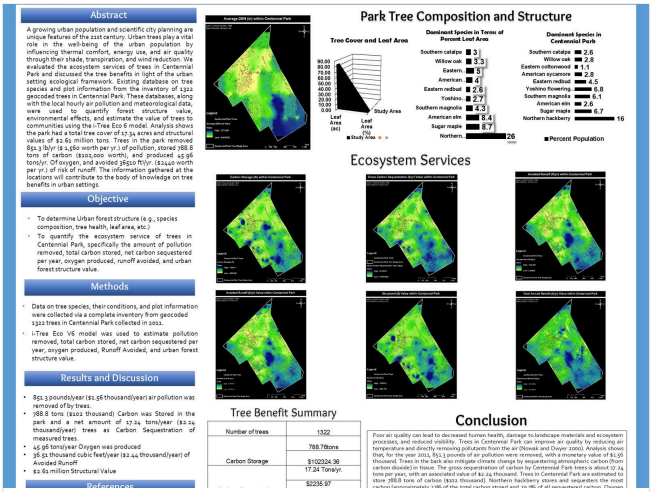
Poster at the Wastewater Disease Surveillance Summit, and first place for SACS at Meharry's 69th Annual Research Day.



2026 · SELECTED SPEAKER

Toward Climate-Resilient Energy Systems

106th AMS Annual Meeting, 39th Conference on Climate Variability and Change, session "Frontiers in Earth System Modeling II."



2019 · POSTER & PANELIST

Ecosystem Services Provided by Urban Trees Within Centennial Park

USGIF GEOINTegration Summit, Davidson County, Nashville.

DISSERTATION RESEARCH · IN DEVELOPMENT

Nuclear Sentinel AI

An explainable, AI-enabled digital-twin framework for dynamic cyber-physical risk assessment and resilience in nuclear operational technology. A related full paper, *Evaluating Multimodal AI and Digital-Twin Context for Cyber-Physical State Characterization in Nuclear Operational Technology*, is under review at the International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (M&C 2027), Columbus, OH, April 18–22, 2027 (Submission 12911). Three further digital-twin abstracts, on accident diagnosis, cross-plant anomaly detection for I&C security, and an operator display with verified language-model explanations, are under review at NPIC&HMIT 2027 (Salt Lake City, May 9–13, 2027).

Alongside it, I am developing **BioGrid Sentinel AI**, which links cyberinfrastructure, environmental monitoring, genomics, and public health intelligence to support radiation surveillance and emergency preparedness in communities near nuclear facilities.

Research platforms

Applications built from this research

NWGS Grid™ LIVE

National wastewater genomic surveillance and public-health decision-support platform · nwgsgrid.com

GridAI™ IN DEVELOPMENT

Geospatial AI and energy-resilience application associated with the accepted SEGDA paper

Nuclear Sentinel AI ONGOING RESEARCH

Dissertation research repository · GitHub

Wastewater & Infectious Disease 9 | Nuclear Sentinel AI 7 | Power & Energy 6 | Geospatial & STEM 4

Papers by venue 14 | Conference tracker 15

First author on every paper, abstract, and poster listed. Research is grouped by domain; within each domain, works are listed by type: peer-reviewed papers, oral presentations and talks, posters and abstracts.

Wastewater Epidemiology & Infectious Disease Surveillance

9 works · 5 papers · 1 oral & talks · 3 posters & abstracts

Wastewater signals, genomic surveillance, machine learning, and forecasting that show where respiratory and other infections are rising, how wastewater relates to clinical burden, and which communities surveillance does not reach.

FIRST-AUTHOR PEER-REVIEWED PAPERS

Decoding Tennessee Wastewater Surveillance: A Multimodal Geospatial Assessment of Infectious-Disease Signals, Surveillance Coverage, and Public-Health Equity ACCEPTED First author

Franklin, V.L. (2027). 12th ICEPTP 2027, London, UK, Apr 8–10, 2027. Accepted; presentation and proceedings publication pending. CSEE 2027 Congress proceedings (ISSN/ISBN, Crossref DOI; indexed in Scopus, Google Scholar, and Semantic Scholar). Final version uploaded · Paper ID 117.

NWGS Grid: A Multimodal Wastewater Genomic Surveillance Framework for Geospatial, Genomic, and Public Health Intelligence, United States, October 2022–September 2026 ACCEPTED First author

Franklin, V.L. (2027). 12th ICEPTP 2027, CSEE 2027 Congress, London, UK, Apr 8–10, 2027 · full paper; accepted, final version uploaded · Paper ID 134.

From Wastewater Signals to Clinical Burden: A Multimodal Machine-Learning and Geospatial Evaluation of Respiratory Virus Surveillance Across United States Jurisdictions ACCEPTED First author

Franklin, V.L. (2027). 12th ICEPTP 2027, CSEE 2027 Congress, London, UK, Apr 8–10, 2027 · full paper; accepted, final version uploaded · Paper ID 133.

Beyond Point Accuracy: Probabilistic Evaluation of Wastewater-Informed Respiratory Hospitalization Forecasts in Fifteen U.S. States ACCEPTED First author

Franklin, V.L. (2027). 12th ICEPTP 2027, CSEE 2027 Congress, London, UK, Apr 8–10, 2027 · full paper; accepted, final version uploaded · Paper ID 135.

Two Ceilings on Wastewater-Based Surveillance: Observable Population Worldwide and Operational Lead Time in the United States ACCEPTED First author

Franklin, V.L. (2027). 12th ICEPTP 2027, CSEE 2027 Congress, London, UK, Apr 8–10, 2027 · full paper; accepted, final version uploaded · Paper ID 136.

ORAL PRESENTATIONS & TALKS

From Wastewater Signals to Clinical Burden: A Multimodal Machine-Learning and Geospatial Evaluation of Respiratory Virus Surveillance Across United States Jurisdictions UNDER REVIEW First author

Franklin, V.L. (2026). APHL ID Lab Con 2027, Atlanta, GA, Mar 15–18, 2027 · oral presentation (poster alternate) · abstract 2531099; under review.

POSTERS & ABSTRACTS

Decoding Tennessee Wastewater Surveillance: A Multimodal Geospatial Assessment of Infectious-Disease Signals, Surveillance Coverage, and Public-Health Equity UNDER REVIEW First author

Franklin, V.L. (2026). APHL ID Lab Con 2027, Atlanta, GA, Mar 15–18, 2027 · traditional poster · abstract 2531131; under review.

Wastewater Genomic Surveillance Grid: A Multimodal Framework for Geospatial, Genomic, and Public Health Intelligence UNDER REVIEW First author

Franklin, V.L. (2026). APHL ID Lab Con 2027, Atlanta, GA, Mar 15–18, 2027 · digital poster · abstract 2531157; under review.

Using GIS and Metagenomics to Enhance Wastewater Surveillance POSTER · 1ST PLACE First author

Franklin, V.L., Gary, T., Sarker, B., & Archer, R. (2025). Poster, 2025 Wastewater Disease Surveillance Summit, Water Environment Federation with CDC, Los Angeles, June 3–4, 2025; abstract published by the Network of Wastewater-Based Epidemiology. 1st Place, 69th Annual Research Day, School of Applied Computational Sciences, Meharry Medical College.

Nuclear Sentinel AI: Nuclear Infrastructure Resilience & Cyber-Physical AI

7 works · 2 papers · 3 paper abstracts · 1 oral & talks · 1 dissertation

AI-enabled digital twins for nuclear operational technology, cyber-physical state characterization, and community health preparedness near nuclear facilities, connected to the Nuclear Sentinel AI dissertation research.

FIRST-AUTHOR PEER-REVIEWED PAPERS

BioGrid Sentinel AI: A Geospatial Digital Twin Framework for Nuclear Infrastructure Resilience and Community Health Preparedness ACCEPTED First author

Franklin, V.L., et al. (2026). 10th EAI SmartGIFT 2026, Tempe, AZ, Nov 12–13, 2026. Accepted; camera-ready submitted, publication pending (Springer LNICST).

Evaluating Multimodal AI and Digital-Twin Context for Cyber-Physical State Characterization in Nuclear Operational Technology UNDER REVIEW First author

Franklin, V.L. (2027). M&C 2027, American Nuclear Society, Columbus, OH, Apr 18–22, 2027 · full paper; under review · Submission 12911.

FIRST-AUTHOR PAPER ABSTRACTS

Digital-Twin Residuals for Accident Diagnosis on a Simulated Pressurized-Water Reactor UNDER REVIEW First author

Franklin, V.L. (2027). 15th NPIC&HMIT 2027 with ISOFIC 2027, American Nuclear Society, Salt Lake City, UT, May 9–13, 2027 · paper; under review · Instrumentation & Controls: Advanced Surveillance, Online Monitoring, Diagnostics, and Prognostics · Submission 14229.

Does Digital-Twin Evidence Carry Over between Plants? Threshold Calibration and Seed Robustness in Cyber-Physical Anomaly Detection for Nuclear Instrumentation and Control Security UNDER REVIEW First author

Franklin, V.L. (2027). 15th NPIC&HMIT 2027 with ISOFIC 2027, American Nuclear Society, Salt Lake City, UT, May 9–13, 2027 · paper; under review · Instrumentation & Controls: Cybersecurity in I&C · Submission 14338.

A Digital Twin Driven Operator Display with Verified Language-Model Explanations for Reactor Accident Diagnosis UNDER REVIEW First author

Franklin, V.L. (2027). 15th NPIC&HMIT 2027 with ISOFIC 2027, American Nuclear Society, Salt Lake City, UT, May 9–13, 2027 · paper; under review · Human Factors: Advanced Visualization, Operator Aids, and Support Systems · Submission 14339.

ORAL PRESENTATIONS & TALKS

International Training Course on Protecting Computer-Based Systems in Nuclear Security Regimes PRESENTER

Idaho National Laboratory · August 5, 2026.

DISSERTATION RESEARCH

Nuclear Sentinel AI: An Explainable, AI-Enabled Digital-Twin Framework for Nuclear Cyber-Physical Risk Assessment IN DEVELOPMENT

Franklin, V.L. Dissertation research, Ph.D. in Data Science (Nuclear Cybersecurity), Meharry Medical College · GitHub repository.

Power & Energy Systems: Energy Justice, Climate Resilience & Environmental Health

6 works · 1 papers · 2 oral & talks · 2 posters & abstracts · 1 chapter

Spatial analysis of power-outage burden, grid disruption, climate stress, and energy infrastructure, and how they fall on socially vulnerable communities.

FIRST-AUTHOR PEER-REVIEWED PAPERS

Socio-Environmental Grid Disruption Analysis (SEGDA): A Multi-Scale Spatial Assessment of Energy Justice and Climate Resilience Across California Census Tracts and Counties, 2018–2023 ACCEPTED First author

Franklin, V.L., et al. (2026). 10th EAI SmartGIFT 2026, Tempe, AZ, Nov 12–13, 2026. Accepted; camera-ready submitted, publication pending (Springer LNICST).

ORAL PRESENTATIONS & TALKS

Toward Climate-Resilient Energy Systems: A Geospatial RAG-Enabled Digital Twin Approach for Equity and Ecosystem Sustainability ORAL · PUBLISHED ABSTRACT First author

Franklin, V.L., et al. (2026). Selected speaker, 106th AMS Annual Meeting, 39th Conference on Climate Variability and Change, session “Frontiers in Earth System Modeling II,” January 26, 2026.

Meharry Ph.D. Spotlight: The Socio-Environmental Grid Disruption Analysis (SEGDA) Framework INVITED TALK

Data Science Nashville Meetup · March 17, 2026.

POSTERS & ABSTRACTS

Natural Gas Infrastructure, Social Vulnerability, and Health Equity in California: A Multi-Scale Spatial Analysis POSTER · PUBLISHED ABSTRACT First author

Franklin, V.L. (2026). Poster, AIM-AHEAD Southeast Hub Research Symposium.

Hidden Communities, Unequal Resilience. SEGDA: Environmental Justice, Power Outage Burden, and Climate Stress Across California Census Tracts and Counties (2018–2023): Implications for Public Health Equity UNDER REVIEW First author

Franklin, V.L. (2026). 4th Annual Dr. Clifton K. Meador Virtual Poster Session, Meharry Medical College · virtual poster · under review; submission status unconfirmed. Winners notified by November 9, 2026.

BOOK CHAPTERS

From Pixels to Infrastructure Resilience: A Reproducible Google Earth Engine and Explainable GeoAI Pipeline for Climate, Grid, and Community Risk CHAPTER PROPOSAL First author

Franklin, V.L. (2026). Proposed for *Geospatial Big Data Analysis in the Cloud with Google Earth Engine*, Taylor & Francis.

Geospatial Science, Urban Ecosystems & STEM Pathways

4 works · 3 oral & talks · 1 posters & abstracts

Foundational GIS research on urban ecosystems and cyberinfrastructure pathways that bring HBCU students into AI, data science, and geospatial intelligence.

ORAL PRESENTATIONS & TALKS

Advancing Student Success Through Cyberinfrastructure Pathways in AI, Data Science, and Geospatial Intelligence at an HBCU PANEL

Panel presenter · MS-CC Annual Meeting · 2026.

HBCU National Spotlight: HBCU Partnerships and Collaborations in Support of Frontline Communities PANEL

Panelist · 11th Annual Environmental Justice & Health Disparities Symposium (CEEJH) · September 10, 2025.

STEM Day Speaker Series INVITED TALK

Invited speaker · Alabama A&M University · 2025.

POSTERS & ABSTRACTS

Analysis and Valuation of Ecosystem Services Provided by Urban Trees within Centennial Park, Davidson County, Nashville, TN POSTER & PANEL First author

Franklin, V., Haile, S., & Link, R. (2019). Student poster presenter and panelist, USGIF GEOINTegration Summit · Tennessee State University.

First-author papers by venue

14 papers & abstracts · 7 accepted · 7 under review · EAI · ICEPTP · American Nuclear Society · APHL

EAI SMARTGIFT 2026 2 · 2 accepted

10th EAI International Conference on Smart Grid and Innovative Frontiers in Telecommunications · Tempe, AZ · Springer LNICST

Socio-Environmental Grid Disruption Analysis (SEGDA): A Multi-Scale Spatial Assessment of Energy Justice and Climate Resilience Across California Census Tracts and Counties, 2018–2023 ACCEPTED First author

Franklin, V.L. · Full paper · camera-ready submitted, publication pending · Power & Energy

BioGrid Sentinel AI: A Geospatial Digital Twin Framework for Nuclear Infrastructure Resilience and Community Health Preparedness ACCEPTED First author

Franklin, V.L. · Full paper · camera-ready submitted, publication pending · Nuclear Sentinel AI

ICEPTP 2027 5 · 5 accepted

12th International Conference on Environmental Pollution, Treatment and Protection · CSEE 2027 Congress · London, UK · April 8–10, 2027

Decoding Tennessee Wastewater Surveillance: A Multimodal Geospatial Assessment of Infectious-Disease Signals, Surveillance Coverage, and Public-Health Equity ACCEPTED First author

Franklin, V.L. · Full paper · final version uploaded · Paper ID 117 · Wastewater

NWGS Grid: A Multimodal Wastewater Genomic Surveillance Framework for Geospatial, Genomic, and Public Health Intelligence, United States, October 2022–September 2026 ACCEPTED First author

Franklin, V.L. · Full paper · final version uploaded · Paper ID 134 · Wastewater

From Wastewater Signals to Clinical Burden: A Multimodal Machine-Learning and Geospatial Evaluation of Respiratory Virus Surveillance Across United States Jurisdictions ACCEPTED First author

Franklin, V.L. · Full paper · final version uploaded · Paper ID 133 · Wastewater

Beyond Point Accuracy: Probabilistic Evaluation of Wastewater-Informed Respiratory Hospitalization Forecasts in Fifteen U.S. States ACCEPTED First author

Franklin, V.L. · Full paper · final version uploaded · Paper ID 135 · Wastewater

Two Ceilings on Wastewater-Based Surveillance: Observable Population Worldwide and Operational Lead Time in the United States ACCEPTED First author

Franklin, V.L. · Full paper · final version uploaded · Paper ID 136 · Wastewater

AMERICAN NUCLEAR SOCIETY (ANS) 4 · 4 under review

M&C 2027, Columbus, OH, April 18–22, 2027 · NPIC&HMIT 2027 with ISOFIC 2027, Salt Lake City, UT, May 9–13, 2027

Evaluating Multimodal AI and Digital-Twin Context for Cyber-Physical State Characterization in Nuclear Operational Technology UNDER REVIEW First author

Franklin, V.L. · M&C 2027 · full paper · Submission 12911 · Nuclear Sentinel AI

Digital-Twin Residuals for Accident Diagnosis on a Simulated Pressurized-Water Reactor UNDER REVIEW First author

Franklin, V.L. · NPIC&HMIT 2027 · paper · I&C 1b · Submission 14229 · Nuclear Sentinel AI

Does Digital-Twin Evidence Carry Over between Plants? Threshold Calibration and Seed Robustness in Cyber-Physical Anomaly Detection for Nuclear Instrumentation and Control Security UNDER REVIEW First author

Franklin, V.L. · NPIC&HMIT 2027 · paper · I&C 1e · Submission 14338 · Nuclear Sentinel AI

A Digital Twin Driven Operator Display with Verified Language-Model Explanations for Reactor Accident Diagnosis UNDER REVIEW First author

Franklin, V.L. · NPIC&HMIT 2027 · paper · Human Factors 2i · Submission 14339 · Nuclear Sentinel AI

APHL ID LAB CON 2027 3 · 3 under review

Association of Public Health Laboratories · Atlanta, GA · March 15–18, 2027

Decoding Tennessee Wastewater Surveillance: A Multimodal Geospatial Assessment of Infectious-Disease Signals, Surveillance Coverage, and Public-Health Equity UNDER REVIEW First author

Franklin, V.L. · Abstract · traditional poster · Abstract 2531131 · Wastewater

From Wastewater Signals to Clinical Burden: A Multimodal Machine-Learning and Geospatial Evaluation of Respiratory Virus Surveillance Across United States Jurisdictions UNDER REVIEW First author

Franklin, V.L. · Abstract · oral presentation · Abstract 2531099 · Wastewater

Wastewater Genomic Surveillance Grid: A Multimodal Framework for Geospatial, Genomic, and Public Health Intelligence UNDER REVIEW First author

Franklin, V.L. · Abstract · digital poster · Abstract 2531157 · Wastewater

Research Conference & Publication Tracker — 2026–2027

15 submissions · 7 accepted · 7 under review · 1 submitted or unconfirmed

RESEARCHER	INSTITUTION	POSITION	ORCID ID
Victoria Love Franklin	Meharry Medical College	Ph.D. Data Science Student · Research Scholar	0009-0004-8883-767X

RESEARCH AREAS

Artificial Intelligence, Geospatial Data Science, Nuclear Infrastructure Resilience, Energy Justice, Environmental Health, and Public Health Surveillance

TOTAL SUBMISSIONS	ACCEPTED	UNDER REVIEW	SUBMITTED / UNCONFIRMED
15	7	7	1

Complete conference submission & publication table

#	CONFERENCE / EVENT	RESEARCH PAPER / ABSTRACT TITLE	FORMAT	STATUS
1	EAI SmartGIFT 2026	BioGrid Sentinel AI: A Geospatial Digital Twin Framework for Nuclear Infrastructure Resilience and Community Health Preparedness NUCLEAR & CYBER-PHYSICAL AI	Full Paper	Accepted Camera-Ready Submitted — Publication Pending

#	CONFERENCE / EVENT	RESEARCH PAPER / ABSTRACT TITLE	FORMAT	STATUS
2	EAI SmartGIFT 2026	Socio-Environmental Grid Disruption Analysis (SEGDA): A Multi-Scale Spatial Assessment of Energy Justice and Climate Resilience Across California Census Tracts and Counties, 2018–2023 ENERGY JUSTICE & CLIMATE	Full Paper	Accepted Camera-Ready Submitted — Publication Pending
3	APHL 2027 ID Lab Con	Decoding Tennessee Wastewater Surveillance: A Multimodal Geospatial Assessment of Infectious-Disease Signals, Surveillance Coverage, and Public-Health Equity WASTEWATER & INFECTIOUS DISEASE	Traditional Poster	Under Review
4	APHL 2027 ID Lab Con	From Wastewater Signals to Clinical Burden: A Multimodal Machine-Learning and Geospatial Evaluation of Respiratory Virus Surveillance Across United States Jurisdictions WASTEWATER & INFECTIOUS DISEASE	Oral Presentation	Under Review
5	APHL 2027 ID Lab Con	Wastewater Genomic Surveillance Grid: A Multimodal Framework for Geospatial, Genomic, and Public Health Intelligence WASTEWATER & INFECTIOUS DISEASE	Digital Poster	Under Review
6	ICEPTP 2027	Decoding Tennessee Wastewater Surveillance: A Multimodal Geospatial Assessment of Infectious-Disease Signals, Surveillance Coverage, and Public-Health Equity WASTEWATER & INFECTIOUS DISEASE	Full Paper	Accepted Final Version Uploaded · Paper ID 117
7	ICEPTP 2027	NWGS Grid: A Multimodal Wastewater Genomic Surveillance Framework for Geospatial, Genomic, and Public Health Intelligence, United States, October 2022–September 2026 WASTEWATER & INFECTIOUS DISEASE	Full Paper	Accepted Final Version Uploaded · Paper ID 134
8	ICEPTP 2027	From Wastewater Signals to Clinical Burden: A Multimodal Machine-Learning and Geospatial Evaluation of Respiratory Virus Surveillance Across United States Jurisdictions WASTEWATER & INFECTIOUS DISEASE	Full Paper	Accepted Final Version Uploaded · Paper ID 133
9	ICEPTP 2027	Beyond Point Accuracy: Probabilistic Evaluation of Wastewater-Informed Respiratory Hospitalization Forecasts in Fifteen U.S. States WASTEWATER & INFECTIOUS DISEASE	Full Paper	Accepted Final Version Uploaded · Paper ID 135
10	ICEPTP 2027	Two Ceilings on Wastewater-Based Surveillance: Observable Population Worldwide and Operational Lead Time in the United States WASTEWATER & INFECTIOUS DISEASE	Full Paper	Accepted Final Version Uploaded · Paper ID 136
11	M&C 2027	Evaluating Multimodal AI and Digital-Twin Context for Cyber-Physical State Characterization in Nuclear Operational Technology NUCLEAR & CYBER-PHYSICAL AI	Full Paper	Under Review Submission 12911
12	NPIC&HMIT 2027 (with ISOFIC 2027)	Digital-Twin Residuals for Accident Diagnosis on a Simulated Pressurized-Water Reactor NUCLEAR & CYBER-PHYSICAL AI	Paper (Abstract Submission)	Under Review I&C 1b · Submission 14229

#	CONFERENCE / EVENT	RESEARCH PAPER / ABSTRACT TITLE	FORMAT	STATUS
13	NPIC&HMIT 2027 (with ISOFIC 2027)	Does Digital-Twin Evidence Carry Over between Plants? Threshold Calibration and Seed Robustness in Cyber-Physical Anomaly Detection for Nuclear Instrumentation and Control Security NUCLEAR & CYBER-PHYSICAL AI	Paper (Abstract Submission)	Under Review I&C 1e · Submission 14338
14	NPIC&HMIT 2027 (with ISOFIC 2027)	A Digital Twin Driven Operator Display with Verified Language-Model Explanations for Reactor Accident Diagnosis NUCLEAR & CYBER-PHYSICAL AI	Paper (Abstract Submission)	Under Review Human Factors 2i · Submission 14339
15	Dr. Clifton K. Meador 4th Annual Poster Session & Lectureship 2026	SEGDA: Environmental Justice, Power Outage Burden, and Climate Stress Across California Census Tracts and Counties (2018–2023): Implications for Public Health Equity ENERGY JUSTICE & CLIMATE	Virtual Poster	Under Review Submission Status Unconfirmed

Conference summary

CONFERENCE	YEAR	SUBMISSIONS	ACCEPTED	UNDER REVIEW	SUBMITTED / UNCONFIRMED
EAI SmartGIFT	2026	2	2	0	0
APHL ID Lab Con	2027	3	0	3	0
ICEPTP	2027	5	5	0	0
M&C	2027	1	0	1	0
NPIC&HMIT	2027	3	0	3	0
Meador Poster Session	2026	1	0	0	1
Total		**15**	**7**	**7**	**1**

Conference websites

EAI SmartGIFT 2026	Nov 12–13, 2026 · Tempe, AZ & virtual	Conference website ↗
APHL 2027 ID Lab Con	Mar 15–18, 2027 · Atlanta, GA	Conference website ↗
ICEPTP 2027 (CSEE 2027 Congress)	Apr 8–10, 2027 · London, UK	Conference website ↗
M&C 2027 (American Nuclear Society)	Apr 18–22, 2027 · Columbus, OH	Conference portal ↗
NPIC&HMIT 2027 (American Nuclear Society)	May 9–13, 2027 · Salt Lake City, UT	Conference website ↗
Dr. Clifton K. Meador Poster Session	2026 · virtual	Lectureship & poster session page ↗

Research portfolio summary: Fifteen conference submission records across six events: seven accepted papers (five at ICEPTP 2027 with final versions uploaded and two at EAI SmartGIFT 2026 with camera-ready versions submitted), seven submissions under review (three APHL ID Lab Con 2027 abstracts, three NPIC&HMIT 2027 paper abstracts, and one M&C 2027 full paper), and one submission awaiting status confirmation. Eight of the fifteen records are in wastewater epidemiology and infectious disease surveillance, and five are in nuclear infrastructure resilience and cyber-physical AI.

Talks & presentations

Selected presentations, panels, and posters.

2026

International Training Course on Protecting Computer-Based Systems in Nuclear Security Regimes

Presenter · Idaho National Laboratory, Aug 5, 2026

2026

Meharry Ph.D. Spotlight: The Socio-Environmental Grid Disruption Analysis (SEGDA) Framework

Invited speaker · Data Science Nashville Meetup, Mar 17, 2026

2026

SEGDA and BioGrid Sentinel AI

Accepted presenter · EAI SmartGIFT

2026

Advancing Student Success Through Cyberinfrastructure Pathways in AI, Data Science, and Geospatial Intelligence at an HBCU

Panel presenter · MS-CC Annual Meeting

2026

Toward Climate-Resilient Energy Systems: A Geospatial RAG-Enabled Digital Twin Approach for Equity and Ecosystem Sustainability

Speaker · 106th AMS Annual Meeting, 39th Conference on Climate Variability and Change

2026

Natural Gas Infrastructure, Social Vulnerability, and Health Equity in California

Poster · AIM-AHEAD Southeast Hub Research Symposium

2025

Using GIS and Metagenomics to Enhance Wastewater Surveillance

Poster · 2025 Wastewater Disease Surveillance Summit, Los Angeles, June 3–4, 2025 (WEF with CDC)

2025

HBCU National Spotlight: HBCU Partnerships and Collaborations in Support of Frontline Communities

Panelist · 11th Annual Environmental Justice & Health Disparities Symposium (CEEJH), Sep 10, 2025

2025

STEM Day Speaker Series

Invited speaker · Alabama A&M University

2019

Analysis and Valuation of Ecosystem Services Provided by Urban Trees Within Centennial Park

Poster & panelist · USGIF GEOINTegration Summit

Teaching & mentorship

Helping the next generation of researchers find their questions.

2025 – Present

Master's Capstone Research Mentor

Meharry Medical College

Guide graduate students through research design, methodology, data analysis, and technical communication.

2025 – 2026

Undergraduate Research Mentor

Minority Serving Cyberinfrastructure Consortium (MS-CC) · Meharry Medical College · Fisk University

Wrote curriculum for and co-mentored the 10-week MS-CC summer research internship in 2025 and 2026, and led one GIS workshop each summer: in 2025, on mapping social determinants of health and the Social Vulnerability Index, and on GIS Cyber Threat Mapping & Spatial Analytics (June 25, 2026).

2015 – Present

STEAM Mentor & Advocate

Community, K–12, and undergraduate

Plan and lead workshops in STEM and geospatial technology, and help people pivot across disciplines and career paths.

2015 – Present

PRN Substitute Teacher

Metro Nashville Public Schools · Memphis Shelby County Schools

Teaching across K–12 classrooms in Nashville and Memphis.

2019

Adjunct Instructor, Introduction to Public Health

University of Memphis · Tennessee Board of Regents

Taught undergraduate coursework on public-health systems and population health.

2018 – 2019

GIS Mentor

Metro Nashville Public Schools

Delivered GIS instruction and mentorship supporting K–12 STEM learning.

Service & leadership

Public appointments, campus leadership, and community work.

Public appointments

Tennessee Boards and Commissions

Public Representative, Tennessee Committee of Clinical Perfusionists

Appointed by Governor Bill Lee · 2025 – Present

Tennessee Notary Public at Large

Commissioned by the Tennessee Secretary of State · 2025 – Present

Leadership

Lead Organizer, Google Developer Groups On Campus, Meharry Medical College

2025 – Present · Workshops, tech talks, and community events connecting student developers, faculty, and industry

Organizer, Google Developer Groups Nashville Professional Chapter

2024 – Present

Founding Chair, National Society of Black Engineers (NSBE), Meharry Medical College

2025 – Present · Founded the first NSBE chapter at Meharry and now serves as Region III Founding Chair & Advisor, leading regional expansion

Student Council Member, School of Applied Computational Sciences

2024 – 2026

Community & STEM outreach

Parade Participant, Tennessee State University 2026 Homecoming Parade

With the team of Karen Johnson, Davidson County Register of Deeds · Jefferson Street, Nashville · Oct 17, 2026

Founder, Coded Culture

Ongoing · A technology, education, and community organization bridging data science, GIS, AI, and digital equity in underserved communities

Organizer, Build with AI 2026

Meharry Medical College · GDG Nashville · TSU AI SMART Center · SACS Cybersecurity Research Center

Founder, Walking with SACS Health & Wellness Initiative

Meharry Medical College · 2026

Volunteer, Black Girls in STEM Summit and Fisk University Career Day

2026

Founder & Organizer, Beale Street Art Crawl

With the Downtown Memphis Commission and City of Memphis · 2018 – 2023

Founder & Organizer, Little Five Points Arts & Vegan Festival

Atlanta, Georgia · 2023

Founder, Dear Music Nonprofit

Supported by the Health Trust Foundation and Downtown Memphis Commission

Community Arts Instructor, Hadley Park Community Center

2017 – 2018

Community Organizer

Tennessee and surrounding regions · 2015 – Present

Affiliations

The institutions, agencies, and professional communities I have worked with and belong to.

ACADEMIC

- Meharry Medical College
- Tennessee State University
- Fisk University
- University of Memphis
- Meharry-Vanderbilt Alliance
- SACS Cybersecurity Research Center

FEDERAL LABS & AGENCIES

- Idaho National Laboratory
  DOE
- Savannah River National Laboratory
  DOE
- Oak Ridge National Laboratory · ORISE
  DOE
- U.S. Naval Research Laboratory
  NAVY · ONR
- U.S. Air Force School of Aerospace Medicine
  DOD
- U.S. Forest Service
  USDA

GOVERNMENT & PUBLIC SERVICE

- Metro Nashville & Davidson County

CONTRACTOR / PARTNER

- Independent Contractor
  1099 · DATA, RESEARCH & TECHNOLOGY

Metro Nashville Public Schools

State of Tennessee

HBCU Environmental Justice Technical Collaborative

Google Data Center
CONTRACTOR · VIA DB SCHENKER

Dell Technologies
INDUSTRY

Chan Zuckerberg Biohub
RESEARCH PARTNER

Minority Serving Cyberinfrastructure Consortium
RESEARCH PARTNER

PROFESSIONAL MEMBERSHIPS

Coded Culture (Founder)

HBCU Environmental Justice Technical Collaborative
MEMBER

National Society of Black Engineers

IEEE
STUDENT MEMBER, 2025–PRESENT · MARKETING & COMMUNICATIONS OFFICER, SACS IEEE STUDENT BRANCH

American Meteorological Society
STUDENT MEMBER, 2025–PRESENT

Google Developer Groups

Association of Public Health Laboratories
PROFESSIONAL MEMBER · WASTEWATER SURVEILLANCE COMMUNITY OF PRACTICE, 2024–PRESENT

Water Environment Federation
PROFESSIONAL MEMBER, 2024–PRESENT

Clean Water Professionals of KY & TN
STUDENT MEMBER, 2025–PRESENT

Alabama, Mississippi & South Carolina Water Environment Associations
STUDENT MEMBER, 2025–PRESENT

SACS Student Ambassador Program, Meharry Medical College
STUDENT AMBASSADOR · SELECTED BY INVITATION

Education

Every degree, all of them in Nashville.

2027

Ph.D. in Data Science, Nuclear Cybersecurity Concentration (expected)

Meharry Medical College · Dean's List 2024–2025 & 2025–2026 · Scholarship Recipient · GPA 3.93

2026

Graduate Certificate, Public Administration & Executive Leadership

Tennessee State University · December 4, 2026

2018

Professional Science Master's (PSM), Applied Geospatial Information Systems

Tennessee State University

2014

B.S. in Urban Studies, Minor in Nonprofit Management & Leadership

Tennessee State University · Dean's List

2005

A.A.S., Health Information Technology

Daymar Institute (formerly Draughons Junior College)

Doctoral advisory & mentorship committee

Meharry Medical College, School of Applied Computational Sciences

PRINCIPAL ADVISOR	**Dr. Uttam Ghosh** Cybersecurity
ACADEMIC ADVISOR	**Dr. Lei Qian** Associate Dean for Curriculum Evaluation & Effectiveness · Computer Science
PROFESSOR & MENTOR	**Dr. Pushpita Chatterjee** Computer Science and Data Science
PROFESSOR & MENTOR	**Dr. Asmah Muallem** Computer Science and Data Science
DEPARTMENT CHAIR	**Dr. Sajid Hussain**

Certifications & training

Introduction to Digital Forensics
Centri · 2026

Metagenomics Next-Generation Sequencing for Pathogen Surveillance and Discovery
Chan Zuckerberg Initiative Biohub & Meharry Medical College · 2026

Build with AI CEU Certificate
Tennessee State University · 2026

Phlebotomy Certificate
Northwest Phlebotomy School · 2026

Annual Cyber Awareness Training
U.S. Air Force · 2025

Python Programming Certificate
University of Michigan · 2020

Certified Phlebotomy Technician (CPT) · Basic Life Support (BLS)
National Registry of Allied Health Professionals, 2026 · American Heart Association, 2025

Honors & recognition

Awards, features, and funding.

2026
Parade Grand Marshal, Nashville Veterans Day Parade
Representing Meharry Medical College (Meharry 150) · Downtown Broadway, Nashville, Nov 11, 2026 · Flyer

Featured
WastewaterSCAN Q&A: Exploring Wastewater Monitoring Research at HBCUs
WastewaterSCAN · Stanford University & Emory University

2026
Featured, Inspiring Black Scientist
Wiley's Inspiring Black Scientists initiative · Announcement

2026
Women's History Month Honoree
HBCU Environmental Justice Technical Collaborative

2026

Featured by Emory University

Rollins School of Public Health

Gangarosa Department of Environmental Health

2025

First Place Research Award, 69th Annual Research Day

School of Applied Computational Sciences, Meharry Medical College

2024–2025 · 2025–2026

Dean's List & Scholarship Recipient

School of Applied Computational Sciences, Meharry Medical College

2024

Health Trust Foundation Grant

Dear Music Nonprofit, as founder

2018 – 2019

State of Downtown and Downtown Vision Awards

Downtown Memphis Commission

2019

Mighty Light Award

Downtown Memphis Commission · Beale Street Art Crawl

2018

Graduate Research Symposium Presenter

Tennessee State University

2017

Power Moves Awards Nominee, Community Advocacy

Power Moves Awards

Technical capabilities

Tools and methods I use most.

AI & Data Science

Machine Learning · Explainable AI · Anomaly Detection · Predictive Analytics · NLP · LLMs · RAG Architectures · LSTM · Statistical Analysis

GIS & Geospatial

ArcGIS Pro/Online · QGIS · Google Earth Engine · GeoPandas · Rasterio · GeoAI · Remote Sensing · Spatial Epidemiology

Systems & Virtualization

Kali Linux · Linux Administration · PowerShell · Docker · Proxmox · VMware

Programming & Data

Python · R · SQL · BigQuery · ETL Pipelines · pandas · scikit-learn · XGBoost

Cybersecurity & Critical Infrastructure

ICS/OT Security · HMI · PLC · SCADA · Vulnerability Assessment · OpenVAS · Wireshark · IDS · Digital Forensics

Visualization & Reporting

Power BI · Tableau · Plotly · Interactive Dashboards · Public Reporting · Open Data

Bioinformatics & Biosurveillance

Genomic Epidemiology | Metagenomics | Next-Generation Sequencing | Wastewater Surveillance | CZ ID

Developed NWGS Grid™, a multimodal geospatial wastewater genomic surveillance application, and presented wastewater research in 2025.