Tenicka Terell Norwood

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Research Interests

Core Areas: Federated Learning, Swarm Intelligence, Privacy-Preserving Machine Learning (PPML), Multimodal Data Fusion
Applications: Trustworthy AI in Healthcare, Algorithmic Fairness, Educational Data Mining

Education

Meharry Medical College Nashville, TN
Ph.D. in Data Science (Expected) *2028*

- **Advisor:** Dr. Uttam Ghosh | **Laboratory:** Distributed Intelligent Security & Cloud Computing Systems (DISCS) Lab
- **Current Research:** *SwarmClinical: Orchestrating Equitable AI at the Edge* — Developing privacy-preserving federated learning frameworks using particle swarm optimization for non-IID clinical data.

Norfolk State University Norfolk, VA
Master of Science (MS), Optical Engineering

Spelman College Atlanta, GA
Bachelor of Science (BS), Physics

Research Experience

Graduate Research Assistant 2024 – Present
DISCS Lab, Meharry Medical College *Nashville, TN*

- **Swarm-Optimized Orchestration:** Developing "SwarmClinical," a novel framework integrating Particle Swarm Optimization (PSO) to address client selection challenges in non-IID Federated Learning environments.
- **Multimodal Data Fusion:** Architecting a "Digital Twin" model fusing time-series physiological data (via LSTMs) with unstructured clinical narratives (via Frozen LLMs) through cross-attention mechanisms.
- **Algorithmic Fairness:** Designing multi-objective fitness functions to minimize demographic variance in model training, directly addressing bias in healthcare AI.
- **Adversarial Unlearning:** Implementing Domain Adversarial Neural Networks (DANN) and Differential Privacy (DP-SGD) to prevent reconstruction of protected patient attributes during gradient aggregation.

Selected Projects 2023 – Present

- **KAYA (Knowledge Assisted Yield Assistant):** Built an AI-powered Tactical Combat Casualty Care decision-support system leveraging Azure OpenAI (GPT-4) with verified medical coding (SNOMED CT, RxNorm) and multi-modal input (text/speech via Azure Cognitive Services). Collaborated with RTX BBN to incorporate KAYA into TAK GPT. Demoed at CivTAK 2025 and Marathon 2026.
- **Advisor X (CyberXpert):** Developed an AI-powered academic advising agent for graduate students with CV-based career analysis, triple-layer safety guardrails, and human escalation routing. Built with FastAPI, React/TypeScript, MongoDB, and Anthropic AI. Demoed to MSCC leadership, March 2026. Supervised by Dr. Uttam Ghosh.
- **Instructor X (CyberXpert):** Engineered an AI teaching assistant for faculty, generating MCQs,

syllabi, and lesson plans with a human-in-the-loop review workflow and FERPA/HIPAA compliance. Implements agentic intent classification, self-evaluation loops, and semantic deduplication. Supervised by Dr. Uttam Ghosh.

- **Pediatric Pneumonia Detection:** Trained a CNN to classify 5,863 chest X-ray images, achieving an **F1 score of 0.92** for the Pneumonia class. [Code]
- **Breast Cancer Diagnosis:** Tuned SVM kernels to predict malignancy in 565 clinical cases, achieving an **AUC of 0.997** and **95.02%** accuracy. [Code]

Professional Experience

Data Analyst I 2026 – Present
Booz Allen Hamilton *Remote*

- Performed exploratory data analysis and developed automated reporting solutions to support data-driven decision-making for client engagements.
- Built and evaluated machine learning models for classification and regression tasks, applying best practices in feature engineering, model selection, and validation.
- Developed and fine-tuned deep learning architectures for structured and unstructured data applications, leveraging PyTorch and TensorFlow.

Senior Consultant (Data Visualization & Applied AI) 2024 – 2025
Excella Consulting *Remote*

- Benchmarked Large Language Model performance on GenAI chat applications against industry standards (including Microsoft Copilot) to optimize retrieval accuracy.
- Engineered metadata frameworks and structured data taxonomies to enhance the precision of AI-driven recommendation agents.
- Designed and executed A/B testing frameworks to evaluate the efficacy of AI-generated insights for federal agency clients.
- Developed analytical dashboards to monitor AI agent performance metrics, facilitating data-driven product iterations.

Assistant Principal (Learning & Development) 2019 – 2023
NYC Department of Education *New York, NY*

- Built statistical models using historical academic data to identify at-risk student populations, enabling targeted interventions that improved graduation rates from **68% to 90%** (2021–2022).
- Automated data processing workflows integrating disparate educational databases, reducing reporting latency and improving data quality.
- Established rigorous data governance protocols for student data privacy, ensuring compliance with federal and state regulations.

Technical Skills

Languages: Python, SQL, R, Java, DAX
Machine Learning: PyTorch, Scikit-learn, TensorFlow, Flower (FL), Gymnasium, NLTK, BERT, CNNs, SVMs, Time Series Analysis (Tsfresh, Darts)
Data Engineering: Azure Synapse, ETL Pipeline Design, SQL Server, FastAPI, Web Scraping (Selenium, Scrapy)
Visualization: D3.js, Power BI, Plotly, Dash, Seaborn, Matplotlib
Tools: Git/GitHub, Docker, Linux, NetworkX, Hypothesis, Microsoft Power Platform

Open-Source Software

FairSwarm (v0.2.0) pypi.org/project/fairswarm
Provably fair particle swarm optimization for federated learning coalition selection. Implements fairness-aware PSO algorithms with convergence guarantees and demographic divergence bounds.
Stack: Python, NumPy, SciPy, Pydantic github.com/dataeducator/fairswarm-library

Publications

[1] **T.T. Norwood**, D. Das, P. Chatterjee, E.S. Bentley, and U. Ghosh, "FairSwarm: Trustworthy Coalition Selection for Fair and Secure Federated Intelligence," submitted to *IEEE Transactions on Consumer Electronics*, February 2026. [Under Review]

[2] D. Das, **T.T. Norwood**, P. Chatterjee, and U. Ghosh, "EduCore: A Privacy-Aware LLM-Driven Education Framework with Intelligent Multi-Agent Support," in *Proceedings of the 2026 IEEE SoutheastCon*, March 2026. [Accepted]

[3] **T.T. Norwood**, J. Claiborne, P. Chatterjee, D. Das, and U. Ghosh, "MedAssist: Towards Explainable Multi-Task ICU Risk Prediction for Clinical Deployment," in *Proceedings of the 2026 IEEE SoutheastCon*, March 2026. [Accepted]

[4] D. Das, **T.T. Norwood**, C. Quarterman, P. Chatterjee, and U. Ghosh, "SMART-STEM: A Multi-Agent AI Framework for K-12 STEM Education Management," in *ISEC'26*, 2026. [Accepted]

[5] D. Das, L.C. Landrum, **T.T. Norwood**, P. Chatterjee, and U. Ghosh, "Deep Learning-Based Wildfire Risk Prediction with Scenario-Specific Model Recommendations," in *Proceedings of the 2025 IEEE 16th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON)*, New York, NY, USA, September 2025.

Conference Presentations

"EduCore: A Privacy-Aware LLM-Driven Education Framework with Intelligent Multi-Agent Support," *IEEE SoutheastCon 2026*, Track 8: Engineering Education, March 13, 2026.

"MedAssist: Towards Explainable Multi-Task ICU Risk Prediction for Clinical Deployment," *IEEE SoutheastCon 2026*, Track 6: AI and Predictive Modeling, March 14, 2026.

Mentoring & Teaching

Research Mentor Summer 2025
Meharry School of Applied Computational Sciences REU Program *Nashville, TN*

- Mentored undergraduate researchers on version control best practices using Git and GitHub for reproducible research workflows.

Honors & Awards

Excella Iron Viz Winner (2024): Awarded "Best Visualization" for custom D3.js implementation.

Most Outstanding Newcomer (2024): Talent Acquisition Analytics Group.

Math for America Master Science Teacher: Selected for prestigious fellowship recognizing excellence in STEM education.

Certifications & Memberships

Certified Scrum Master (CSM) | Certified Scrum Product Owner (CSPO) | Security Clearance: Public Trust | IEEE Student Member