

SMAILA AMOANU

PhD Student in Statistics and Data Science | Quantitative Research | Software Engineering
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PROFILE

PhD student in Statistics and Data Science with training in probability, statistical inference, time series, simulation, machine learning, and mathematical modeling. Current work includes robust inference for ARMA models under dependent innovations and research on stock-market valuation, stochastic volatility, stationary distributions, and historical financial data. Alongside research, I design and deploy database-backed and AI-assisted software systems. This combination has given me experience moving from statistical questions and computational experiments to working software.

EDUCATION

University of Nevada, Reno | *PhD in Statistics and Data Science* | 2024-Present | Reno, Nevada

- Passed doctoral qualifying examinations in Probability and Statistics (2025) and Mathematical Statistics (2026).
- Graduate work includes time series, categorical data analysis, probability, mathematical statistics, and statistical computing.

African Institute for Mathematical Sciences (AIMS), Rwanda | *MSc in Mathematical Sciences, Distinction* | 2023-2024

- Master's research: Retrospective Impact Quantification of Malaria Interventions in Ghana.

Kwame Nkrumah University of Science and Technology (KNUST), Ghana | *BSc in Statistics, First Class Honours* | 2018-2022

QUANTITATIVE RESEARCH EXPERIENCE

Valuation Measure of the Stock Market Using Stochastic Volatility and Stock Earnings | Research with Prof. Andrey Sarantsev | University of Nevada, Reno | 2026-Present

- Investigate a stochastic stock-market valuation model with earnings, household, and bond-related factors, focusing on long-run behavior and distributional properties.
- Derived stationary distributions for log-transformed variables, including $\ln(R)$ and $\ln(V)$, and used Python simulations with burn-in to examine marginals, variance, kurtosis, and dependence.
- Extended the empirical analysis with verified annual bond returns (1926-2015) and a reconstructed dividend-based valuation series (1825-1925), using autoregression, residual diagnostics, and unit-root testing to examine dependence and mean reversion.
- The stationary-distribution analysis is being integrated into the referee-revised EJOBSAT manuscript for resubmission, and I am being added as a coauthor.

Robust Covariance Estimation for ARMA QMLE under Dependent Innovations: When Do HAC Lags Matter? | Time-Series Research | JSM 2026 Presenter

- Study inference for ARMA quasi-maximum likelihood estimation when innovations are weakly dependent rather than independent.
- Developed Monte Carlo experiments to examine finite-sample confidence-interval coverage using sandwich and HAC covariance estimators under several dependence settings and sample sizes.
- Compared lag-zero and positive-lag covariance corrections to determine when dependence in the score process requires additional HAC lags for reliable inference.
- Presented the work in the Inference Under Dependence session at the 2026 Joint Statistical Meetings in Boston.

Forecasting Relationship Dissolution Across Three- and Five-Year Horizons: Predictive Performance, Explanation Stability, and Uncertainty | Manuscript in review | 2026

- Used longitudinal survey data to forecast dissolution over three- and five-year horizons, comparing logistic regression, Random Forest, and XGBoost under out-of-sample evaluation.
- The strongest held-out Random Forest models achieved ROC-AUC values of 0.911 at three years and 0.889 at five years; precision-recall performance was also examined because dissolution was relatively uncommon.
- Assessed calibration, repeated-resampling stability, nested tuning, SHAP-based explanation stability, and split-conformal uncertainty rather than relying on a single train-test split.

Uncertainty-Aware Fusion of Geofencing and Facial Verification | Ongoing research | 2026

- Developing a statistical framework for combining geolocation evidence and facial-verification evidence when both sources are subject to measurement uncertainty.
- Compare geofence-only, face-only, fixed dual-threshold, and learned fusion approaches using discrimination, calibration, false acceptance, false rejection, and behavior near decision boundaries.
- The study extends the current AttendPro verification setting from separate location and face checks toward calibrated evidence fusion, with attention to uncertain GPS measurements and difficult facial-verification conditions.

Design, Implementation, and Controlled Evaluation of a Session-Bound Attendance Protocol with Rotating QR Codes and Uncertainty-Aware Geofencing / Accepted for publication, IJACSA / 2026

- Designed and evaluated a server-authoritative attendance protocol using rotating QR credentials, session/state binding, duplicate controls, and uncertainty-aware geofencing.
- Conducted 8,800 protocol observations, 8,000 token-lifetime observations, and 75,000 controlled geofence simulations.
- At 15 m reported accuracy, increasing the uncertainty weight from 0 to 0.5 reduced false acceptance from 3.85% to 0% while false rejection increased from 5.10% to 20.70%, making the security-usability trade-off explicit.
- Used the controlled evaluation to identify where stricter location rules improve integrity and where they impose a usability cost.

Financial Time-Series Forecasting with Statistical and Machine-Learning Models / Independent quantitative study

- Compared ARIMA, GARCH, Random Forest, and XGBoost for S&P 500 forecasting.
- Evaluated one-step-ahead forecasts using MAE, RMSE, and MAPE, comparing classical time-series models with nonlinear machine-learning alternatives.
- Examined practical differences between models built around conditional mean or volatility structure and flexible predictive models learned from data.

Retrospective Impact Quantification of Malaria Interventions in Ghana / MSc research / AIMS Rwanda

- Studied the historical contribution of malaria interventions in Ghana using transmission modeling and counterfactual simulation, with particular attention to indoor residual spraying.
- Combined intervention and epidemiological information with deterministic and stochastic modeling to compare observed conditions with counterfactual intervention scenarios.
- Used reproducible simulation and sensitivity analysis to quantify intervention effects while accounting for uncertainty in the modeled transmission process.

Machine Learning for Insurance Technical Pricing / Applied statistical learning study

- Compared K-nearest neighbors, Random Forest, and XGBoost for insurance pricing prediction using held-out predictive performance.
- Evaluated RMSE and R-squared and used SHAP and partial-dependence analysis to examine how important predictors contributed to model output.
- Focused on the balance between predictive accuracy and interpretability in an applied risk-modeling setting.

PUBLICATIONS, MANUSCRIPTS AND PRESENTATIONS

- **Under revision following peer review.** “Valuation Measure of the Stock Market Using Stochastic Volatility and Stock Earnings.” European Journal of Business, Science and Technology (EJOBSAT), 2026. Coauthor.
- **Accepted for publication.** Smaila Amoanu and Bright Wiredu Nuakoh. “Design, Implementation, and Controlled Evaluation of a Session-Bound Attendance Protocol with Rotating QR Codes and Uncertainty-Aware Geofencing.” International Journal of Advanced Computer Science and Applications (IJACSA), 2026.
- **In review.** “Forecasting Relationship Dissolution Across Three- and Five-Year Horizons: Predictive Performance, Explanation Stability, and Uncertainty.” 2026.
- **Conference presentation.** “Robust Covariance Estimation for ARMA QMLE under Dependent Innovations: When Do HAC Lags Matter?” Joint Statistical Meetings, Boston, August 2026.

SOFTWARE ENGINEERING EXPERIENCE

Full-Stack Software Engineer and Product Developer / Arkos DataTeks / 2019-Present

- Take software products from requirements and data modeling through implementation, deployment, training, and ongoing support.
- Build database-backed applications for schools, event organizers, workforce teams, churches, readers, and academic communities.
- Maintain production services on Linux VPS infrastructure, including Nginx, Unicorn/Uvicorn, HTTPS, database migrations, backups, health checks, and release verification.

Database Developer and Consultant / Independent Client Projects / 2019-Present

- Designed relational database systems for clients in Ghana and abroad, including requirements analysis, ERDs, forms, queries, dashboards, automated reports, training, and handover.

Database Developer and Consultant / PEKO Plaza / Jun 2020-Apr 2021 / Kumasi, Ghana

- Replaced spreadsheet-based processes with relational databases for several business divisions and introduced routine reporting, backup procedures, and user training.

SELECTED SOFTWARE AND AI SYSTEMS

Acadelyn / AI-Assisted Academic Opportunity Discovery Platform / acadelyn.com

- Designed and deployed a platform for discovering funded study, research assistantships, scholarships and fellowships, grants, conferences and calls for papers, journals and publication opportunities, and academic jobs.
- Implemented profile-guided and query-guided discovery. Live web search is combined with AI-based extraction and classification so opportunities can be structured, filtered, and matched to user interests rather than presented as unprocessed search results.
- Built recommendation, saved-opportunity, deadline/calendar, email-notification, document/profile, administrative, trusted-source, and background-discovery workflows.
- Deployed a containerized production stack using Next.js, a Python API served with Uvicorn, PostgreSQL with pgvector, Redis, background workers and scheduled tasks, and Nginx.

Arkos AttendPro / Event and Workforce Management Platform

- Developed a production platform for event registration and check-in, workforce attendance, session schedules, participant records, audit trails, badges, communications, payments, and operational reporting.
- Implemented rotating QR credentials, server-side eligibility checks, duplicate prevention, uncertainty-aware geofencing, camera scanning, manual fallback workflows, and optional facial verification.
- Configured the platform for real event operations, including SkillFest 2026, with workflows adapted to organizer requirements.
- Used the deployed system as the basis for the controlled attendance-verification research accepted for publication in IJACSA.

Arkos SchoolPro / School Management Platform

- Built a role-based system covering admissions, student records, academics, examinations, attendance, billing and fees, HR/payroll, inventory, communication, and management reporting.
- Deployed the platform for GFI and supported setup, migration, training, controlled examination-result release, backups, and day-to-day operation.
- Extended the system with finance, HR/payroll, student-portal, and report-authentication workflows while maintaining role-based access and administrative controls.

Smaila Reader / Digital Bookstore and Browser-Based Reader

- Created a direct-sales storefront and browser-based reader with workflows for adding books, reviewing purchases, managing reader access, and delivering updates.
- Implemented server-authoritative access controls so entitlement decisions are made by the application rather than trusted to the browser alone.

Arkos ChurchPro and Arkos HR Pro / Additional production systems

- Developed church-management workflows for member/ministry records, communication, certificates, pastoral reporting, mobile member access, and multiple attendance paths.
- Developed HR/payroll workflows for employee records, payroll, payslips, leave, attendance, departments, bank details, self-service, and operational reporting.

TECHNICAL SKILLS

Statistical & Quantitative Methods: Probability, inference, time series, Monte Carlo simulation, regression, classification, econometrics, model validation, calibration, uncertainty quantification.

Programming & Scientific Computing: Python, R, SQL, JavaScript/TypeScript, PHP, Bash; NumPy, pandas, scikit-learn.

Machine Learning & AI: Random Forest, XGBoost, SHAP; OpenAI APIs, LLM extraction/classification, embeddings, vector search, retrieval workflows, prompt design.

Data & Software Engineering: PostgreSQL, pgvector, MySQL, SQLite, Redis; Flask, FastAPI/Uvicorn, SQLAlchemy, REST APIs, Node.js/Express, React, Next.js; Linux, Docker, Nginx, Git/GitHub, SSL/HTTPS.

TEACHING AND TECHNICAL COMMUNICATION

Graduate Teaching Assistant / Instructor / University of Nevada, Reno / 2024-Present

- Teach and support Precalculus, Calculus, and statistics/probability through lectures, recitations, problem solving, grading, and office hours.
- Served as the main instructor for university mathematics courses, preparing lessons, assignments, assessments, and student support.

Teaching Assistant / KNUST, Ghana

- Supported instruction in Regression Analysis, Differential Equations, and Algebra.

Technical Educator / DataTechsTutorials

- Built an audience of 15,200+ YouTube subscribers through practical lessons on SQL, Microsoft Access, Excel, database design, and business systems.