STELLAMARIS NAKACWA
Applied Research Science · Engineering · ML Systems · Computer Visions · Document Intelligence
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PROFESSIONAL SUMMARY

Applied Research Scientist with 8+ years delivering ML systems, large-scale data engineering, and geospatial intelligence across national labs, academia, and applied programs. Currently leads 4 concurrent projects at DOE/NETL, including design of a novel self-supervised multimodal CV architecture, achieving 85–90% classification accuracy on material segmentation and engineering multi-GB data pipelines processing ~1k documents for national energy science infrastructure. Deep expertise in self-supervised representation learning, multimodal geospatial fusion, conditional structured prediction, GPU-optimized inference, and production ML systems. Prior program leadership across a 400+ chapter, 80-country network contributing 26M+ open map edits. Consistent record of novel architecture design, published research, and measurable outcomes at program scale.

PROFESSIONAL EXPERIENCE

AI/ML Research Scientist 2023 – Present
Leidos / NETL Remote

Critical Minerals Portfolio - AI/ML Model Development (2 Projects)

- Designed a novel self-supervised multimodal CV architecture and achieved > 90% model accuracy fine-tuned on material composition analysis -- with multi-fusion satellite input (i.e. OLI, MSI, SAR, DEM) across dedicated encoder branches and fusion layer learning cross-modal interactions predictive embeddings.
- Developed a two-stage conditional inference pipeline for fine-graine material predictions masking and segmenting local classes dynamically.
- Led a 6-member team for data labeling & training strategy, creating over 980,000 training patches for augmentation & fine-graine self-supervised model development.

Oil & Gas Transportation Portfolio - Data Science & Engineering (2 Projects)

- Deployed GPU-accelerated inference, processing 100+ heterogeneous documents, recovered decades of inaccessible institutional knowledge and established a scalable foundation for national-scale oil wellhead material database.
- Architected ETL pipelines unifying fragmented well log and geological records from disparate national sources into WELLBASE - a standardized, multi-GB queryable infrastructure now serving ongoing DOE energy transition research programs (peer-reviewed, 2024).
- Designed schema reconciliation models resolving decades of inconsistent industry records; reduced data integration errors and enabled consistent national-scale oil & gas analytics for policy and research consumption.
- Built NLP transformer pipelines that cut document-to-data latency significantly, converting unstructured archive corpora into structured, ML-ready datasets at scale.
- Led AI-driven topology-modeling for U.S. gas pipeline network (3M+ miles), integrating spatial graph representations and incident records to locate resilient pipelines for hydrogen blend & double smart sensor predictive accuracy.
- Drove ROKBASE development as the primary data engineer - delivering an interactive subsurface core imaging database across 4 energy domains (CO_2 storage, H_2 storage, critical minerals, geothermal); presented at GSA Connects 2023.

Graduate Research Assistant - ML & Data Systems 2021 – 2022
West Virginia University Morgantown, WV

- Led training data quality research for large-scale geospatial systems; schema reconciliation strategies reduced data loss from database invariance in the USAID-funded U-WIMP project.
- Produced open geospatial datasets now freely available and in active use across humanitarian and AI/ML research communities via WPdx and YouthMappers partnerships.

Program Director - Mapping 2017 – 2023
YouthMappers / George Washington University Remote

- Led geospatial AI training and open science curriculum across a network that grew to 400+ university chapters in 80+ countries, with members contributing 26M+ OpenStreetMap edits impacting 68 million people globally.

- Directed USAID Women's Global Development & Prosperity Initiative (WGDP-I) regional ambassador program increasing 60% women's participation in geospatial technology and delivering training programs across 5 continents.

RESEARCH & PUBLICATIONS

Lite Learning: A Lightweight Framework for Model Training in Resource-Constrained Environments · Peer-Reviewed · 2023

WELLBASE: A Standardized Data Infrastructure for Well Log Analytics · DOE/NETL — Peer-Reviewed · 2024

ROKBASE: Rock Sample Database for Imaging Deep Learning Applications · GSA Connects — Peer-Reviewed · 2023–2024

Numerical Smoothing of Noisy Evaluation Surfaces: Classical Approach to Robust ML Threshold Optimization · Harrisburg University (w/ Luis P.) · 2025 *[In Preparation]*

Architecture Resilience Under Network Degradation: Benchmarking Embedding Retrieval Systems · Harrisburg University — M.S. Thesis · 2026 *[Forthcoming]*

TECHNICAL SKILLS

CV / Vision	Multimodal fusion (optical, SAR, terrain), self-supervised learning concepts (VICReg, Barlow Twins, SimCLR), conditional structured prediction, semantic segmentation, patch-based encoding, SLAM, CNN architecture, Sensor data.
ML / AI	Transformer architectures, HNSW/IVF ANN (FAISS), RAG, LLM fine-tuning, embedding systems, NLP, neural retrieval, GPU optimization, pseudo-label domain adaptation
Languages	Python (primary), C++/CUDA, R, SQL; NoSQL, vector databases
Data Eng.	Large-scale ETL pipelines, schema design & reconciliation, document intelligence (PDF/OCR/NLP), data quality frameworks, cloud data platforms
Geospatial	GIS, OpenStreetMap, satellite imagery analysis, ArcGIS/QGIS, 2D/3D spatial modeling, geospatial ML pipelines
Methods	Statistical modeling, optimization algorithms, ROC/PR/F1 evaluation, focal loss, time-series forecasting, parallel & distributed computing
Delivery	End-to-end ML lifecycle (design → deploy → monitor), technical communication to mixed audiences, cross-functional program leadership

EDUCATION

M.S., Computing Systems & Algorithms (ML/AI) 2024 – 2026
Harrisburg University of Science and Technology

M.S., Geography - Geospatial & Data Systems
West Virginia University

B.S., Land Surveying & Geomatics