

## TOBILOLA OGUNBOWALE

### Machine Learning Engineer

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## PROFESSIONAL SUMMARY

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Machine Learning Engineer with 2+ years building production ML systems, an MS in Biomedical Informatics, and 10+ years of healthcare domain expertise. Developed deep learning pipelines, LLM-powered clinical tools, and predictive analytics deployed in research and laboratory environments. Proven ability to scale operations while maintaining regulatory compliance

## TECHNICAL PROJECTS

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### Medical AI Agent with Retrieval-Augmented Generation

[github.com/tobilola/medical-ai-agent](https://github.com/tobilola/medical-ai-agent)

- Built autonomous clinical reasoning agent using LLMs with multi-step planning, tool use, and self-correction.
- Integrated PubMed search, drug interaction checks, clinical calculators, and patient-data querying.
- Developed RAG system using ChromaDB with indexed guidelines and protocols.
- Deployed via FastAPI + Streamlit; processed 100+ clinical queries with 92% satisfaction.

Tech: LangChain, GPT-4, ChromaDB, FastAPI, PostgreSQL, Python

### PneumoniaNet AI: PyTorch Deep Learning Healthcare System

[github.com/tobilola/pneumonianet-ai](https://github.com/tobilola/pneumonianet-ai)

- Designed custom CNN combining ResNet50 + spatial attention for pneumonia detection.
- Built full training pipeline with AdamW, LR scheduling, and gradient clipping.
- Delivered production inference system with batch processing and attention visualization.
- Created React demo interface for real-time image analysis.

Tech: PyTorch, torchvision, ResNet50, React, Python

### Requiva Lab Management System

*Production System - Currently in Use | Adelaiye-Ogala Lab, University at Buffalo*

- Deployed active lab operations platform used by biomedical research teams.
- Integrated ML models for predictive reordering, spending forecasts, anomaly detection, and vendor optimization.
- Built grant-based spending tracker reduces reporting time from 2 hours to 5 minutes.
- Implemented real-time inventory tracking and automated alerts.

Tech: Python, Streamlit, Firestore, Scikit-learn, ARIMA/Prophet

### LIMS-ELN Integration Platform for Laboratory Systems

[github.com/tobilola/LIMS-ELN\\_Integration](https://github.com/tobilola/LIMS-ELN_Integration)

- Built middleware enabling bidirectional sync between LIMS and ELN systems.
- Implemented anomaly detection, NER-based metadata tagging, and compliance scoring.
- Designed asynchronous pipelines with Redis queues processing 1000+ samples/day.
- Delivered FastAPI-based REST API with audit-ready logging.

Tech: FastAPI, PostgreSQL, MongoDB, Redis, spaCy, Docker

## PROFESSIONAL EXPERIENCE

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### Research Systems Operations Manager

*University at Buffalo, Department of Medicine | 2024 - Present | Buffalo, NY*

- Designed AI-powered automation for inventory tracking, equipment scheduling, and workflow optimization across a \$2M+ research portfolio.
- Led cross-functional teams integrating LIS/LIMS with clinical workflows.
- Deployed predictive analytics reducing operational expenses by 60% while maintaining HIPAA, IRB, and IACUC compliance.

- Built real-time analytics dashboards improving forecasting accuracy by 20%.
- Established automated QC procedures reducing manual data errors by 85%.

### **Graduate Research Assistant - Bioinformatics & Laboratory Informatics**

*SUNY Center for Excellence in Bioinformatics & Life Sciences | Nov 2022 - Dec 2023 | Buffalo, NY*

- Built Snakemake/Nextflow pipelines for RNA-seq, WGS, and single-cell datasets (100GB+).
- Configured LIMS workflows for biospecimen tracking and automated processing.
- Implemented QC pipelines using Seurat, Cell Ranger, and GATK.
- Developed Python scripts for preprocessing and reporting, reducing analysis time by 40%.

### **Digital Transformation Lead - Laboratory Operations**

*Afri-Global Medicare Limited | June 2020 - Aug 2021 | Lagos, Nigeria*

- Led enterprise-wide LIS implementation during COVID-19, scaling testing to 1M+ samples.
- Achieved 95% user adoption across multi-site diagnostic operations.
- Reduced turnaround time by 35% through workflow optimization and automation.
- Scaled testing capacity by 300% while maintaining CLIA-level quality standards.
- Built automated reporting system reduces manual reporting time by 70%.

### **Healthcare Technology Analyst**

*Field Approach Consult | Feb 2018 - May 2020 | Lagos, Nigeria*

- Managed LIMS and clinical data systems for a 500+ participant epidemiological study, ensuring data integrity and system reliability
- Supported international research program whose outputs informed WHO policy recommendations
- Translated client requirements into technical specifications and optimized laboratory workflows
- Evaluated diagnostic technologies for operational feasibility in emerging healthcare markets
- Coordinated cross-functional teams to implement quality systems and SOPs across lab technology platforms

### **Laboratory Coordinator & Analyst**

*University of Lagos, Central Research Laboratory | 2015 - 2017 | Lagos, Nigeria*

- Performed molecular diagnostics including NGS workflows, PCR/RT-PCR, ELISA, and specimen processing
- Implemented Lean Six Sigma quality systems to reduce workflow errors and improve turnaround time
- Led equipment validation, calibration, and preventive maintenance programs
- Managed reagent inventory, monitored storage conditions, and investigated temperature excursions

## **EDUCATION**

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### **Master of Science, Biomedical Informatics**

*University at Buffalo, State University of New York | December 2023*

Relevant Coursework: Machine Learning, Deep Learning, Bioinformatics Algorithms, Health Data Analytics, Clinical Decision Support Systems

### **Master of Science, Medical Microbiology**

*University of Lagos | December 2016*

Focus: Clinical Microbiology, Molecular Diagnostics, Laboratory Quality Management

### **Bachelor of Science, Microbiology**

*Redeemer's University | August 2012*

## **CERTIFICATIONS & PROFESSIONAL DEVELOPMENT**

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- **Certified associate in project management (CAPM)** - Project Management Institute (PMI)
- Member, American Medical Informatics Association (AMIA)
- Active contributor to open-source healthcare informatics projects on GitHub

## TECHNICAL SKILLS

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**Programming:** Python, JavaScript (ES6+), SQL, Bash, R

**Deep Learning & CV:** PyTorch, torchvision, Transfer Learning, CNNs (ResNet, VGG, Inception), Attention Models, Medical Image Analysis, Optimization (AdamW/SGD), LR Scheduling

**AI & Machine Learning:** LangChain, GPT-4 API, Scikit-learn, XGBoost, Random Forest, Gradient Boosting, spaCy, ChromaDB, Vector DBs, RAG, Time-series (ARIMA, Prophet), Anomaly Detection, Feature Engineering

**Frontend:** React 18, Vite, HTML5/CSS3, Tailwind, Recharts, Chart.js, Responsive Design, WCAG Accessibility, PWAs

**Backend:** FastAPI, Flask, Streamlit, REST APIs, GraphQL, WebSockets, Microservices, asyncio, JWT/OAuth2 Auth

**DevOps & CI/CD:** Docker, Docker Compose, GitHub Actions, pytest, Vitest, ESLint, Prettier, SonarQube, Git, Render, Netlify, Heroku

**Laboratory Informatics:** LIMS/LIS (EPIC Beaker, Cerner, Meditech, Sunquest), Lab Automation, Biospecimen Tracking, Instrument Integration (HL7, ASTM), Workflow Design, QC Systems

**Data Engineering & Databases:** PostgreSQL, MongoDB, Redis, Firebase, Pandas, NumPy, ETL Pipelines, Data Warehousing, SQL Optimization

**Bioinformatics:** Snakemake, Nextflow, Seurat, Cell Ranger, GATK, BWA, SAMtools, STAR, DESeq2, HPC/Slurm, Genomic Data Analysis

**Healthcare Compliance:** HIPAA, CLIA, FDA 21 CFR Part 11, GLP, GMP, ISO 17025, IRB, IACUC, HL7 FHIR

**Project Management:** CAPM, Agile/Scrum, Kanban, Lean Six Sigma, DMAIC, Risk & Change Management, Stakeholder Communication, Budgeting, Jira, Confluence