Oluwaseun (Sean) Alo

Electrical Engineering — University of Kentucky, Lexington, KY
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Summary

Electrical Engineer specializing in photonic computing architectures, hardware acceleration, and energy-efficient system design. Combines 5 years of hands-on experience deploying and optimizing optical transmission systems in large-scale telecom infrastructure with cutting-edge research in photonic integrated circuits for ML workloads. Experienced in hardware characterization, optical alignment, test bench development, and translating device-level photonic designs into scalable computing architectures. Seeking to leverage both practical optical systems expertise and advanced research experience to develop next-generation photonic computing solutions for industry.

Education

Doctor of Philosophy (Ph.D.), University of Kentucky, Electrical Engineering Aug 2022 – May 2026 (Expected)

Master of Science (M.Sc.), University of Ibadan, Nigeria, Electrical/Electronic Engineering Nov 2019

Bachelor of Engineering (B.Eng.), Federal University of Akure, Nigeria, Electrical/Electronic Engr.

Certifications & Training

AIM Photonics Packaging Workshop — American Institute for Manufacturing Integrated Photonics Feb 2026

- Completed advanced training in photonic integrated circuit packaging and assembly techniques
- Focus areas: Co-packaged optics (CPO), fiber-to-chip coupling, thermal management, and package-level integration
- Hands-on experience with industry-standard packaging techniques for silicon photonics commercial deployment

Experience

Graduate Researcher Aug 2022 – Present

Unconventional Computing Architectures and Technologies (UCAT) Lab, University of Kentucky

- Built optical and electronic test benches to evaluate photonic integrated circuits (PICs), performing optical alignment with submicron precision, laser-fiber coupling optimization, and automated signal-response measurements using tunable laser sources and high-speed photodetectors
- Developed scalable tensor processing architectures leveraging analog photonic computing, achieving 3.2× throughput improvement and 40% reduction in electronic control overhead through optimized dataflow and device-circuit co-design
- Set up ferromagnetic resonance (FMR) test benches integrating microwave sources (up to 20 GHz), vector network analyzers, electromagnets with automated field control, and data acquisition to characterize thin-film magnetic heterostructures
- Modeled device-level performance of microring resonators (MRRs) and Mach-Zehnder interferometers (MZIs) in Lumerical INTERCONNECT, analyzing impact of fabrication variations, optical loss (<0.5 dB/cm), and thermal crosstalk on system-level accuracy
- Published 4 peer-reviewed papers in IEEE and ACM venues on photonic accelerators, stochastic computing, and GEMM optimization for neural networks

Lead Project Engineer Jan 2020 – Aug 2022

Huawei Technologies Nigeria Co. Ltd

- Led technical delivery of 70+ optical and wireless network infrastructure projects valued at $50M+, making architecture decisions for optical fiber networks, microwave backhaul, and multi-band radio access deployments

- Evaluated and selected critical hardware components including optical amplifiers (EDFA), wavelength-selective switches (WSS), and coherent transceivers, ensuring 15–20% energy efficiency improvements through optimized optical power management
- Managed cross-functional engineering teams across 8–12 concurrent deployments, reducing commissioning timelines by 20% through systematic workflow optimization

Commission Engineer Sep 2017 – Dec 2019

Huawei Technologies Nigeria Co. Ltd

- Commissioned 80+ 4G/LTE base stations and optical transmission systems, performing hardware validation, RF drive testing, and optical link verification using OTDRs, achieving 99%+ first-time acceptance rate
- Conducted field-level testing of optical transceivers (10G/100G DWDM) and baseband units through systematic measurement including optical power budgets, fiber loss characterization, and dispersion analysis
- Optimized network coverage across 300+ square kilometers by analyzing signal quality metrics, improving cell-edge throughput by 30% and reducing call drop rates by 25%

Selected Projects

Photonic Tensor Processing Architecture (Dissertation Research, in progress): Designed scalable photonic tensor core using MZI meshes and MRR weight banks for energy-efficient deep learning inference. Achieved 3.2× throughput improvement through custom dataflow optimization. Modeled device performance in Lumerical and Cadence, co-designing photonic circuits with CMOS electronics for 8-bit integer operations. Built optical test bench for characterizing fabricated MRR-based circuits. *Tools: Lumerical, Cadence, Python, MATLAB*

SPOGA: Scalable Photonic GEMM Accelerator: Architected low-power analog photonic accelerator for INT8 matrix multiplication. Implemented novel encoding scheme reducing optical modulation energy by 35%. Performed device-circuit-architecture co-simulation analyzing MRR fabrication variations (±5 nm tolerance), optical loss, and crosstalk effects. Published at IEEE ISVLSI 2024. *Tools: Lumerical, Python, PyTorch*

ASTRA: Optical Stochastic Computing Accelerator: Contributed to silicon photonic transformer accelerator design. Analyzed energy-accuracy tradeoffs for stochastic bit-stream generation using integrated MZ modulators and optical MAC operations. Demonstrated 2.5× speedup for LLM inference. Published in ACM TECS. *Tools: Python, Lumerical, TensorFlow*

Technical Skills

Hardware Design & Simulation: Lumerical INTERCONNECT, MODE, FDTD, Cadence Virtuoso (schematic, layout, DRC, LVS), SystemVerilog, Verilog, Silicon photonics device modeling — Analog/mixed-signal circuit design

Photonics Packaging & Integration: Co-packaged optics (CPO), Fiber-to-chip coupling, Package-level thermal management, PIC assembly techniques, Industry-standard packaging workflows

Experimental & Characterization: Optical alignment, laser-fiber coupling, photodetector characterization, OTDR, VNA, spectrum analyzers, oscilloscopes, optical spectrum analyzers — FMR test bench, S-parameter measurements, signal generation (20 GHz), Python automation, GPIB/SCPI control

Software & ML: Python, C++, MATLAB, PyTorch, TensorFlow, Git

Architecture & Analysis: Dataflow optimization, energy-performance modeling, throughput-latency analysis, hardware-algorithm co-design, quantization-aware architectures, tensor core and photonic computing system simulation

Publications

Published 4 peer-reviewed papers in IEEE and ACM venues including IEEE ICCD 2025, ACM TECS, ACM GLSVLSI 2025, and IEEE ISVLSI 2024 on photonic tensor cores, stochastic computing accelerators, and GEMM optimization. Full list: snalo.github.io/publications

Work Authorization

U.S. Permanent Resident/Green Card Holder