OLUWASEUN ALO

Ph.D. Candidate, Electrical Engineering | University of Kentucky, Lexington, KY
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Work Authorization: U.S. Permanent Resident/Green Card Holder (No visa sponsorship required)

SUMMARY

Ph.D. candidate in Electrical Engineering specializing in hardware acceleration, photonic computing, and energy-efficient architecture. Experienced in designing and analyzing advanced computing systems for machine learning workloads. Research integrates novel photonic integrated circuit (PIC) designs with emerging ML algorithms to enhance performance and scalability.

RESEARCH INTERESTS

- Photonic and Neuromorphic Computing
- Hardware Acceleration for Machine Learning
- Energy-Efficient and Scalable Computing Architectures
- Optical Interconnects and Systems Design

EDUCATION

- **Doctor of Philosophy (Ph.D.),** University of Kentucky, Lexington, KY, August 2022 – Present (Dissertation: *Design of an Efficient, Scalable, and Flexible Tensor Processing Architecture with Photonic Integrated Circuits)*
- **Master of Science (M.Sc.),** University of Ibadan, NG, Electrical/Electronic Eng., November 2019
- **Bachelor of Engineering (B. Eng.),** Federal University of Akure, NG, Electrical/Electronic Eng.

EXPERIENCE

- **Graduate Researcher,** Unconventional Computing Architectures and Technologies (UCAT) Lab, University of Kentucky, August 2022 - Present
  - Developing photonic-based hardware accelerators for Geometric Deep Learning applications.
  - Designed scalable tensor processing architecture and dataflow for energy-efficient neural computation.
  - Published multiple papers in IEEE and ACM venues; ongoing research focuses on GEMM accelerators and photonic computing models.

- **Research Assistant,** University of Ibadan, August 2016 – March 2019
  - Investigated Content-Based Image Retrieval Systems (CBIRS) using combined features of color, edge, and texture.
  - Co-authored publications on texture analysis and image retrieval techniques.

- **Project Manager**, Huawei Technologies Nig Co. Ltd, NG**,** September 2017 - August 2022
  - Led multi-vendor service delivery projects, collaborating with cross-functional technical and customer teams.
  - Managed operational issues, service escalations, and system integration.
  - Coordinated with architects and vendors to deliver robust and cost-efficient telecom solutions.

SELECTED PUBLICATIONS

1. I. Thakkar, S. S. Vatsavai, V. S. P. Karempudi and **O. A. Alo**, "Scaling Up the Sustainability of Photonic Tensor Cores with Device-Circuit-Signaling Co-Design," **Accepted** at the **2025 IEEE International Conference on Computer Design (ICCD 2025)**, Dallas, TX, USA, Nov. 2025

2. S. Afifi, **O. A. Alo**, I. Thakkar, and S. Pasricha, "ASTRA: A Stochastic Transformer Neural Network Accelerator with Silicon Photonics," in **ACM Transactions on Embedded Computing Systems.** [Online]. Available: https://dl.acm.org/doi/10.1145/3769092

3. S. Afifi, **O. A. Alo**, I. Thakkar, and S. Pasricha, " A Light-Speed Large Language Model Accelerator with Optical Stochastic Computing," in **Proceedings of the Great Lakes Symposium on VLSI 2025**, pp 922-928**.** [Online]. Available: https://dl.acm.org/doi/full/10.1145/3716368.3735299

4. **O. A. Alo,** S. S. Vatsavai, and I. Thakkar, "Scaling Analog Photonic Accelerators for Byte-Size, Integer General Matrix Multiply (GEMM) Kernels," in **Proceedings of the IEEE Computer Society Annual Symposium on VLSI (ISVLSI)**, Knoxville, TN, USA, Jul. 2024, pp. 409-414. [Online]. Available: https://doi.org/10.1109/ISVLSI61997.2024.00080

5. V. S. P. Karempudi, S. S. Vatsavai, I. Thakkar, **O. A. Alo**, J. T. Hastings, and J. S. Woods, "A Low-Dissipation and Scalable GEMM Accelerator with Silicon Nitride Photonics," **arXiv preprint arXiv:2402.11047**, Feb. 2024. [Online]. Available: https://arxiv.org/abs/2402.11047

6. S. S. Vatsavai, V. S. P. Karempudi, **O. A. Alo,** and I. Thakkar, "A Comparative Analysis of Microrings Based Incoherent Photonic GEMM Accelerators," in **Proceedings of the 25th International Symposium on Quality Electronic Design (ISQED)**, Santa Clara, CA, USA, Apr. 2024, pp. 1-8. [Online]. Available: https://doi.org/10.48550/arXiv.2402.03149

7. **O. A. Alo** and A. R. Zubair, "Grey Level Co-occurrence Matrix (GLCM) Based Second-Order Statistics for Image Texture Analysis," **International Journal of Computer Applications**, vol. 93, no. 8, pp. 64-73, 2019. [Online]. Available: https://doi.org/10.48550/arXiv.2403.04038

8. A. R. Zubair and **O. A. Alo,** "Content-based Image Retrieval System using Second-Order Statistics," **International Journal of Computer Applications**, vol. 176, no. 36, pp. 12-20, Jul. 2020. [Online]. Available: https://doi.org/10.5120/ijca2020920475

SELECTED CONFERENCE PRESENTATION & ATTENDANCE

- A.R. Zubair, **O.A. Alo**, *"Content-based image retrieval system using second-order statistics"*, 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF), University of Ibadan, Nigeria. December 2021. *(Oral Presentation)*

- **O. A. Alo,** S. S. Vatsavai, and I. Thakkar, "Scaling Analog Photonic Accelerators for Byte-Size, Integer General Matrix Multiply (GEMM) Kernels," in **Proceedings of the IEEE Computer Society Annual Symposium on VLSI (ISVLSI)**, Knoxville, TN, USA

- **O.A. Alo**, *"Silicon Photonics-Based Integer Dot-Product Engine with Configurable Operand Precision"*, Electrical and Computer Engineering (ECE) 2023 Symposium, University of Kentucky, Lexington, KY, USA. May 2023. *(Poster Presentation)*

- Attendee, 2023 IEEE 13th Annual Computing and Communication Workshop and Conference (CCWC), Las Vegas, NV, USA. March 8-11, 2023.

- Attendee, The 36th International Workshop on Languages and Compilers for Parallel Computing (LCPC 2023), University of Kentucky, Lexington, KY, USA. October 11-13, 2023.

SELECTED PROJECTS

- Photonic Tensor Processing Architecture – Designed scalable tensor processing cores leveraging photonic integrated circuits for energy-efficient deep learning workloads. Focused on architecture design, dataflow optimization, and throughput improvement.
- GEMM Accelerator for Neural Networks (SPOGA) – Developed and optimized low-power GEMM accelerator architectures targeting integer and byte-size matrix multiplication kernels for ML workloads.
- Optical Stochastic Computing Accelerator (ASTRA) – Contributed to design and simulation of stochastic transformer-based accelerator using silicon photonics, improving speed and reducing dissipation for LLM workloads.

TECHNICAL SKILLS

- Hardware & Design Tools: Cadence (schematic, layout, DRC, LVS), Lumerical, MATLAB, VLSI Design, EDA Tools, Accelerator Architecture
- Programming: Python, C++, Git, Linux, SystemVerilog (basic)
- Machine Learning / Simulation: PyTorch, TensorFlow

PROFESSIONAL MEMBERSHIPS

1. Institute of Electrical and Electronics Engineers (IEEE) Graduate Member, 2021 – Present
2. International Society for Optics and Photonics (SPIE), Member, 2023 - Present
3. Association of Computer Machinery (ACM) Student Member, 2022 – Present
4. Council for the Regulation of Engineering in Nigeria (COREN), 2021 – Present
5. Eta Kappa Nu – HKN, 2023 – Present