

Chinedu Johnson Umeike

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EDUCATION

University of Maryland
Doctor of Philosophy in Computer Science

College Park, MD
August 2024 - May 2028

University of Kansas
Master of Science in Computer Engineering (with honors); Cumulative GPA: 4.00/4.00
Thesis: Optimizing gem5 Simulator Performance: Profiling Insights and Userspace Networking Enhancements

Lawrence, KS
Expected May 2024

Federal University of Technology Owerri
B.Eng. Electronics and Computer Engineering; Cumulative GPA: 4.43/5.0

Imo State, Nigeria
Nov 2011 - Dec 2016

RESEARCH INTEREST

- **Overview:** Computer Architecture, Operating Systems, Data Center Networking, Performance Evaluation, Hardware-Software Co-design, High-Performance Computing, Emerging Technologies, Machine Learning & Simulation Techniques

PEER-REVIEWED PUBLICATIONS & POSTER PRESENTATIONS

- **Johnson Umeike**, Siddharth Agarwal (UIUC), Nikita Lazarev (MIT), Mohammad Alian *Userspace Networking in gem5*, in IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), Indianapolis, 2024. — [PRESENTER: JOHNSON UMEIKE](#)
- **Johnson Umeike**, *Userspace Networking in gem5*, ACE center for Evolvable Computing, SRC Jump 2.0 center, Oct 4, 2023 — POSTER PRESENTATION
- **Johnson Umeike**, Neel Patel, Alex Manley, Amin Mamandipoor, Heechul Yun, Mohammad Alian, *Profiling gem5 Simulator*, in IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), Raleigh, 2023. — [PRESENTER: JOHNSON UMEIKE](#)
- **Johnson Umeike**, *Profiling an Architectural Simulator*, 55th IEEE/ACM International Symposium on Microarchitecture (MICRO), 2022 — POSTER PRESENTATION

RESEARCH EXPERIENCE

Architecture Research Group
Graduate Research Assistant

Lawrence, Kansas
Aug 2022 - Current

- **Accelerating Computer Architecture Simulation:**
 - Performed detailed microarchitectural analysis on Intel Xeon Gold and Apple M1 chips for optimizing the performance of software architectural simulators.
 - Developed evaluation methodologies for executing a full-fledge architectural simulator (gem5) on another cloud-based FPGA-Accelerated simulator (FireSim).
 - Designed and executed extensive simulations using gem5, FireSim, and ChipYard to evaluate the effect of various system-level and micro-architectural configurations on simulation speed. Achieved over **3x** speed up with our approach.
 - Utilized Python and C++ for developing simulation scripts and analysis tools, streamlining the research workflow.
 - Authored a research paper titled *"Profiling gem5 Simulation"* published in the IEEE International Symposium on Performance Analysis of Systems and Software (**ISPASS '23**).
- **Device-less Networking:**
 - Collaborated with researchers from University of Illinois, Urbana-Champaign, and MIT, to extend gem5's NIC hardware model and device driver, design a parameterizable hardware load-generator model for synthetic traffic generation, and develop a suite of benchmarks aimed at rigorously stress-testing the performance of the kernel-bypass networking in real-system and gem5.
 - Leveraged Docker containers to isolate our test environment and employed Git for version control while actively contributing to the open-source project.
 - Implemented an heuristic for classifying packet drops in the gem5 Intel **i8254x** Hardware NIC model, enabling easy identification of the bottleneck resource (CPU, DMA engine, or transmit pipeline) in high-speed networks.
 - Participated in JUMP2.0 project as an **SRC student research scholar** which will drive long-term path-finding university research that substantially increases the performance, efficiency, and capabilities of broad classes of electronics systems for both commercial and military applications.
 - Authored a research paper titled *"Userspace Networking in gem5"* published in the IEEE International Symposium on Performance Analysis of Systems and Software (**ISPASS '24**).
- **A Novel CPU Notification Mechanism for high-speed networks:**
 - Exploring an efficient mechanism that leverages aggressive Simultaneous Multi-Threading (SMT) for CPU notification without the overhead of interrupt or polling in modern terabit/multi-gigabit networks

TEACHING AND MENTORING EXPERIENCE

School of Engineering, University of Kansas

Kansas, USA

Graduate Teaching Assistant

Jan 2022 - May 2024

- **Computer Architecture (94 Students):** Jan 2024 - May 2024
 - Assisted in teaching, grading, and preparing computer assignments, as well as mid-term exams for the course.
 - Held regular office hours to support students with the materials of the course.
- **Introduction to Computing (40 Students):** Jan 2022 - May 2022
 - Led weekly lab sessions for an introductory Python programming course, guiding students through hands-on coding exercises and troubleshooting.
 - Assessed and provided constructive feedback on programming assignments, ensuring students received timely and meaningful insights into their coding practices.
 - Conducted regular check-ins to assess progress, identify challenges, and adjust mentoring strategies to meet the unique needs of each student.
- **Programming I (11 Students):** June 2022 - July 2022
 - Facilitated weekly lab sessions during the summer, graded students homework, and provided constructive feedback for improving students' coding skills
 - Held regular office hours to assist students with questions related to Python programming concepts, debugging, and problem-solving.

PROFESSIONAL EXPERIENCE

MainOne Cable Company (An Equinix Company)

Lagos, Nigeria

Network Solutions Architect

March 2019 - Jan 2022

- **Software-Defined Networking:**
 - Led the design of Addax Petroleum Nig.'s IT migration to MainOne's Lekki Data Center, securing the deal with a detailed technical proposal and dual fiber last-mile connectivity.
 - Represented the Technical Solution team, deploying a new point-of-presence in Bonny Island, resulting in a significant revenue boost and key client acquisitions.
 - Engaged with various technologies, such as GPON, VoIP, MetroEthernet, SDH, SDWAN, MPLS VPN, Fiber Optics, MW radio, Satellite, and networking protocols.
 - Collaborated with project management and account teams, achieving a 65% bid acceptance rate, earning commendations, and securing a promotion within the company.

HONORS AND AWARDS

- **MS Honors in Computing Engineering:** Received an Honors for my final master's exam given by the EECS department
- **2024 Summer Internship:** Chosen for the competitive Student Research Program to intern at Lawrence Berkeley National Lab
- **ASPLOS 2023:** Top 9 participants for the FireSim/Chipyard workshop co-located with ASPLOS 2023 in Vancouver, Canada
- **MICRO 2022:** Top 15 participants for the MICRO 2022 Student Research Competition in Chicago, USA
- **NNPC/Mobil Scholarship:** NNPC/Mobil Unlimited Scholarship (February, 2013 - December, 2016)
- **Educational Support Program:** The Fountain of Life Church Scholarship Award for Excellence (December 2012)
- **WAEC Examination:** Ranked top 1% in West African Examination Council result in my school (July 2011)

SKILLS SUMMARY

- **Programming Languages:** C++, C, Python, IBM Qiskit, Bash scripting
- **Simulation & Design Tools:** gem5, FireSim, ChipYard, McPAT, Vivado
- **Profiling & Debugging Tools:** GDB, Intel vTune, PCM, RDT, Linux perf, FlameGraph
- **Machine Learning Frameworks:** TensorFlow, PyTorch, TFLite, TFLite Micro, Keras, Google Colab
- **Other Packages:** Docker, QEMU, Git, L^AT_EX, VSCode

ACADEMIC PROJECTS

- **VISR (Pronounced 'visor'):** This virtual slide companion incorporates a Keyword Spotting (KWS) model that actively listens for cues from the presenter and facilitates smooth slide transitions in response to voice commands, ensuring a seamless and effortless presentation experience. It was deployed in ESP32S3 Microcontroller Unit.
- **Error Correction with the Shor Code:** Implemented, simulated, and analyzed Shor code (Sho95) that can handle any single qubit errors (bit-flips, phase-flips, or others) using IBM Qiskit. This was part of the requirement for completing the 2-semester IBM Qubit by Qubit's Quantum Computing Course.)
- **Solar-powered Three-Wheeler:** Transformed an ICE (Internal Combustion Engine) three-wheeler into an eco-friendly, solar-powered vehicle. Collaborated in the integration of solar panels, implementing an innovative power system that reduced reliance on traditional fuels, mitigated environmental impact, and demonstrated a commitment to sustainable transportation solutions.

CERTIFICATIONS

- **Machine Learning:** Supervised Machine Learning: Regression and Classification – Coursera (in view) - August 2024
- **Quantum Computing:** Qubit by Qubit's Quantum Computing Course by IBM - April 2023
- **IEEE MICRO 2022 Conference:** Student Participant Certificate for the ACM Student Research Competition - October 2022
- **Windows/Linux System Administrator:** Google IT Professional Certificate - August 2022