Gideon Adjei

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Research Interests

Computer Architecture, VLSI Design, Embedded Systems, Secure Systems, Operating Systems, Cryptography, Quantum Computing

Education

Kwame Nkrumah University of Science and Technology (KNUST) Jan 2021 – Aug 2024
B.Sc. Computer Engineering GPA: 3.81/4.00

Pope John SHS and Seminary Sept 2017 – Jun 2020
Secondary Education Aggregate: 10

Research Experience & Projects

Cryptographic C Library for Blockchain Jan 2025 – Present
Designed and implemented a modular C library for blockchain primitives, including hashing and digital signatures. Demonstrated its application through a prototype blockchain-based e-voting system, strengthening expertise in cryptography, distributed systems, and system-level security.

PilOS: Custom Operating System Jan 2025 – Present
Developing an x86 operating system with a multiboot-compliant bootloader and protected-mode kernel. Implemented low-level memory management and process handling, laying groundwork for secure and efficient system design while gaining experience with kernel programming and assembly integration.

ARMv7 Assembly Programming Mar 2025 – Present
Wrote assembly routines for arithmetic, memory-mapped I/O, and hardware interaction on ARMv7. Investigated performance tuning and pipeline hazards to better understand instruction-level parallelism, gaining insights into embedded optimization and architecture-aware programming.

USB PHY Design in Verilog Jul 2025 – Present
Designed and simulated a synthesizable USB 1.1 Physical Layer transceiver entirely in Verilog. Implemented NRZI encoding/decoding, bit-stuffing, and sync detection for full protocol compliance, preparing design for FPGA deployment with simulation (ModelSim) and hardware verification.

Software Contributions (C) Dec 2023 – Feb 2024
Built a minimal Unix shell in C with support for process management, piping, redirection, and job control. Implemented a custom `printf` function using variadic arguments, showcasing deep understanding of C internals and strengthening skills in debugging (GDB, Valgrind) and systems programming.

Teaching & Outreach

Teaching Assistant, KNUST Oct 2024 – Present
Conducted weekly lab sessions for 200 undergraduates. Assisted grading, led tutorials, and

implemented learning strategies that improved student performance by 20%.

YouTube Educator (GaviviTeaches) Dec 2024 – Present
Created educational videos on C programming, debugging with GDB, and file handling. Helping beginners understand systems programming concepts and expanding access to low-level programming education.

Publications / Reviews

Gideon Adjei et al. (2024). Review of Homomorphic Encryption. Departmental Research Review, KNUST.

Technical Skills

Programming & Languages: C, C++, Python, Verilog, ARMv7 Assembly, MATLAB
Hardware/Design Tools: Quartus, ModelSim, Oscilloscopes, FPGA synthesis, Cadence Virtuoso
Systems & Tools: Linux, Docker, Git, Make, GDB, Valgrind
Research Methods: Literature review, critical analysis, Python/MATLAB for data analysis

Honors & Awards

College of Engineering Excellence Award, KNUST Jun 2022
Awarded to students with a cumulative GPA above 75.00.

HDLBits Global Ranking (Verilog) Mar 2025
Completed all 182 Verilog exercises, mastering digital logic, FSMs, and hierarchical design.

Leadership & Service

Math & Science Club Advisor, Pope John SHS 2019 – 2020
Mentored students in math competitions, science fairs, and STEM workshops, fostering critical thinking and problem-solving.

Professional Memberships

Individual Member, RISC-V International Jun 2025 – Present

Additional Information

Languages: English (Fluent), Akan (Fluent), French (Basic)
Interests: Embedded systems, Systems programming, Football, Mathematical problem-solving

Referees

Prof. Emmanuel Kofi Akowuah – Associate Professor, Computer Engineering, KNUST
Email: ekakowuah.coe@knust.edu.gh Phone: +233-20-996-5679

Dr. (Mrs.) Theresa-Samuelle Maame Atwemaah Adjaidoo – Lecturer, Computer Engineering, KNUST
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Dr. Eric Tutu Tchao – Senior Lecturer, Computer Engineering, KNUST
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