

# Gideon Adjei

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## Research Interests

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

## Education

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**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

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### 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

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### 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**

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

## **Technical Skills**

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**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**

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### **MTN Bright Scholarship Award**

2023

Awarded to academically outstanding and financially deserving students across Ghana. Covered tuition, accommodation, and stipend.

### **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**

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### **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**

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Individual Member, RISC-V International

Jun 2025 – Present

## **Additional Information**

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Languages: English (Fluent), Akan (Fluent), French (Basic)

Interests: Embedded systems, Systems programming, Football, Mathematical problem-solving

## **Referees**

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**Prof. Emmanuel Kofi Akowuah** – Associate Professor, Computer Engineering, KNUST

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**Dr. (Mrs.) Theresa-Samuelle Maame Atwemaah Adjaidoo** – Lecturer, Computer Engineering, KNUST

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