FREDA APPIAGYEI

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SUMMARY

Specializing in analog and mixed-signal circuit design with hands-on experience across multiple process nodes and tapeout experience. I have designed and verified ultra-low-power systems for sensing applications, taking circuits from concept through post-layout simulation and silicon realization. My work addresses real-world design challenges under strict area and power constraints, with a focus on reliability and efficiency. Motivated by the drive to keep learning, growing, and applying engineering knowledge to solve real-world problems with lasting impact.

SKILLS

Digital Design & Verification: Verilog, HDL, FSM Design, Logic Optimization, Digital Simulation, ASIC Tapeout
EDA Tools: Cadence Virtuoso, Spectre, LTSpice, ModelSim, Calibre, Xcelium, Ansys HFSS
Programming & Scripting: Python, MATLAB, C, C++, Perl
Hardware Platforms & Development: Arduino, Xilinx ISE, Embedded Systems, Dext Science Kits, PCB Design

PROJECTS

Design of an LC Voltage-Controlled Oscillator for NV Quantum Sensing May 2025

- Co-designed and simulated an LC VCO with a 2.5–8 GHz tuning range targeting low phase noise.
- Explored tuning behavior and temperature effects using Cadence Spectre.

Design of a Sub-Microwatt 5- bit ADC for Microrobotic Temperature Sensing Oct 2024 - Dec 2024

- Designed and taped out a $< 1\,\mu$W, $60 \times 50 \mu m^2$ dual-slope ADC optimized for PVT variations.
- Developed and verified FSM control in Verilog; completed pre/post-layout simulations in Cadence.

Design and Optimization of 16-Bit Full Adder Architectures May 2024

- Designed and analyzed three full-adder architectures using Cadence; optimized for delay, power, and area.
- Simulated performance under supply variations and evaluated results through waveform analysis.

8-Bit Microprocessor Mar 2021 - May 2021

- Led a team of six to design and simulate a fully functional 8-bit microprocessor using LOGISIM.
- Managed task delegation and ensured seamless integration of components within a strict deadline.

Aquanens - a water quality monitoring system Sept 2020 - Dec 2020

- Led a team of three to develop the system and secured funding for its design and deployment.
- Integrated temperature, ultrasonic, and oxygen sensors with Arduino for real-time web-based monitoring.

WORK AND RESEARCH EXPERIENCE

Graduate Research Assistant, Cornell, Electrical & Computer Engineering Jan 2024 - Dec 2024

- Researched sensors and actuators for microrobots in healthcare; modeled an ISFET for biomedical applications.
- Optimized a biologically inspired random search algorithm for a microrobot to improve target-finding success.

Intern, Electricity Company of Ghana Limited - Workshop Sept 2021-Nov 2021

- Assisted in load forecasting and hourly demand analysis, for improved power distribution planning.
- Conducted insulation resistance, open/short circuit tests, and maintained transformers for substation reliability.

EDUCATION

Cornell University, M.Sc. Electrical & Computer Engineering | GPA: 3.5/4.0 August 2023 - Present

- Fellowship Recipient, Cornell Graduate School

Kwame Nkrumah University Of Science and Technology (KNUST), B.Sc. 2018 - 2022
Electrical & Electronic Engineering | GPA: 3.97/4.0