

# Emmanuel Boruett

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## EDUCATION

### SWARTHMORE COLLEGE

Bachelor of Engineering and Mathematics

GPA: 3.7/4.0

Relevant Coursework: Embedded Systems, Mobile Robotics, Data Structures and Algorithms, Differential Equations, Electromagnetic Field Theory, Microelectronics, Digital Signal Processing(Spring 2025)

Tools & Languages: C/C++, Python, Matlab, VSCode, Oscilloscope, LTspice, Spectrum Analyzer, Signal Generator

### WORK EXPERIENCE

#### Jamii Telecommunications Limited

Nairobi, Kenya

*Electrical Engineering Intern*

Jun 2024-Aug 2024

- Optimized GSM and LTE networks, improving KPIs such as Mobility, Accessibility, Retainability, and Service Integrity, resulting in a 5-10% enhancement in overall network QoS and User Experience (UX)
- Conducted network capacity dimensioning, successfully mitigating capacity bottlenecks, contributing to a 15% increase in network capacity utilization
- Resolved network and service degradations, ensuring 99.5% uptime through proactive troubleshooting and escalations to relevant teams
- Addressed customer complaints through physical network optimizations, enhancing coverage in problem areas, and reducing customer complaints by 8%

#### Kaizen Electronics Limited

Nairobi, Kenya

*Embedded Systems Intern*

May 2023-Aug 2023

- Contributed to the development of stable firmware for the revolutionary product ModPower, reporting directly to the CTO on BIOS development and testing for deeply embedded and RTOS systems
- Gained experience with modems in Linux, including kernel driver and module development, and cross-compilation of C and Python modules using the OpenWRT SDK
- Worked primarily with Texas Instruments MSP430, developing and testing USB serial interfaces, RTC, e-ink displays, I2C and SPI communication, solar charging, power management, timers, and watchdogs
- Developed expertise in power management and control, RTC, remote firmware updates/OTA BSL, and other critical embedded system functionalities

## PROJECTS

### Cuda Accelerated Ray Tracer

- Developed an efficient ray tracing engine using NVIDIA CUDA, accelerating the rendering process by parallelizing ray-geometry intersection calculations across GPU cores
- Integrated complex lighting models such as Phong and Blinn-Phong shading, enabling realistic lighting, shadows, and materials like glass, metal, and transparent objects
- Utilized CUDA streams and asynchronous computation to maximize GPU efficiency, overlapping computation and memory transfers for smoother and faster rendering
- Optimized GPU memory management using CUDA's shared memory and texture memory, significantly reducing memory access latency and improving computational throughput

### Wave Propagation Modeling

- Developed a MATLAB program to model the propagation of electromagnetic waves in various media, focusing on different scenarios such as free space, dielectric materials, and lossy materials
- Implemented numerical methods such as the Finite Difference Time Domain (FDTD) and Finite Element Method (FEM) to simulate wave propagation characteristics and boundary conditions
- Analyzed wave behavior under varying conditions, including changes in frequency, angle of incidence, and polarization, utilizing graphical representations to illustrate results
- Investigated practical applications, such as radar wave propagation in urban environments, analyzing multipath effects and signal fading to inform design strategies for communication systems

### Buck Converter PCB Design

- Designed and laid out a PCB for a buck converter using KiCAD, ensuring efficient voltage regulation for power supply applications
- Selected and integrated key components such as inductors, capacitors, and MOSFETs, optimizing for size and cost without compromising performance
- Conducted detailed circuit analysis to determine power requirements, ripple voltage, and efficiency, ensuring the design met operational specifications
- Implemented a feedback control loop to maintain stable output voltage across varying load conditions, utilizing compensation techniques to enhance transient response