Arhaam Hossain

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Education

Stony Brook University **August 2022 – Expected May 2026**
Bachelor of Engineering in Electrical Engineering *Stony Brook, NY*

Relevant Coursework

- Digital Logic Design
- Embedded Systems
- Circuit Board Design
- Semiconductor Devices
- Integrated Electronics
- Control Systems Design
- Power Electronics
- VLSI System Design

Technical Skills

Languages: C, C++, MATLAB, Python, AVR Assembly, SystemVerilog, VBA
Developer Tools: Altium Designer, KiCAD, HSPICE, LTspice, Microchip Studio, OrCAD, Virtuoso, Xilinx Vivado
Lab Tools: Oscilloscope, Digital Multimeter, Bench Power Supply, Function Generator, Logic Analyzer, Spectrum Analyzer

Experience

Spellman High Voltage **June – August 2025**
R&D Power Electronics Engineering Intern *Hauppauge, New York*

- Engineered and validated a custom gate-drive transformer for a SiC FET–based high-voltage solid-state relay (SSR) operating at switching frequencies up to 20 kHz and rated for isolation voltages up to 100 kV.
- Modeled transformer magnetics and SSR switching behavior in LTspice, including leakage inductance and core saturation limits, to predict switching losses and ensure reliable gate-drive operation prior to hardware testing.
- Improved high-voltage reliability by refining gate-drive topology to reduce ringing and overshoot, verified through oscilloscope measurements of gate voltage, drain current, and switching transients.

GE Vernova **May – August 2024**
Systems Engineering Intern *Schenectady, New York*

- Developed a VBA-based modeling tool to evaluate round-trip efficiency, guaranteed availability, and usable energy capacity for 500+ MW Battery Energy Storage Systems (BESS) by parameterizing different cell characteristics.
- Created an OCV and DC internal resistance model for lithium-ion cells operating in constant power mode, enabling thermal and efficiency analysis under realistic load conditions.
- Built an VBA-based workflow to ingest vendor cell test data, pull specific cycle data points, and benchmark them against the degradation model, increasing confidence in life-cycle predictions.

Projects

Low Power IC for Neuromorphic Computing | *Cadence Virtuoso* **August – Present**

- Developing a spiking neural network (SNN) for word detection in noisy environments, achieving above 90% accuracy, and mapped trained synaptic weights to hardware to reduce memory usage and improve energy efficiency.
- Implementing a Transposable Neurosynaptic Array (TNSA) compute-in-memory core using the SkyWater 130nm PDK, integrating a ReRAM cell array with source, bit-line, and word-line drivers/registers.
- Designing and implementing CMOS transistor-level ReRAM cells and peripheral driver/register circuitry in Cadence Virtuoso, including schematic capture, physical layout, DRC/LVS verification, and tapeout-ready layout preparation.

FPGA-Accelerated Reactive Collision UAV | *MATLAB, SystemVerilog* **September 2023 – Present**

- Developing a reactive collision UAV using a Zybo Z7: Zynq-7000 FPGA SoC and SEN0634 global-shutter optical-flow camera, offloading frame-based optical flow computation to FPGA, reducing vision-processing latency.
- Implementing a frame-based optical flow pipeline using MATLAB Vision HDL Toolbox, translating algorithmic models into SystemVerilog processing blocks and integrating FPGA motion vectors with control logic for real-time response.
- Validating real-time collision response by testing optical flow outputs and control behavior under dynamic motion, and different lighting, ensuring stable operation without reliance on GPS.

Autonomous Robot Control System | *Altium Designer, C++* **June – August 2025**

- Designed and fabricated a custom 4-layer ESP32-based control PCB supporting four brushed DC motors via dual H-bridge drivers, enabling closed-loop wireless control for autonomous robotic platforms.
- Developed C++ firmware for motor control, communication, integrating onboard LiDAR and command interfaces for autonomous operation.
- Implemented DC-DC converters and UART communication for USB-C programming, validating current delivery and thermal performance under peak motor load using bench testing and oscilloscope measurements.