Bevan Jebanesan Noble Anbunesan

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EDUCATION

NC State University, Raleigh **Expected Graduation: May 2027**
Master of Science | Computer Engineering
- Coursework: ASIC and FPGA Design with Verilog, Microprocessor Architecture, Electronic System Level and Physical Design.

Anna University – Loyola ICAM College of Engineering and Technology, India **Aug 2021 – May 2025**
Bachelor of Engineering | Electronics and Communication Engineering
- Coursework: VLSI and Chip Design, Digital Systems Design, Embedded Systems and IOT Design

TECHNICAL SKILLS

- **Technical:** RTL design, Digital design, Timing constraints (SDC), CDC, Micro-Architecture
- **Languages and Scripts:** C, C++, Python, Verilog, System Verilog, TCL
- **Tools**: Altera Quartus Prime, Cadence (Virtuoso), Synopsys, AutoCAD, Git

PROJECT EXPERIENCE

C++ Cache & Memory Hierarchy Simulator **Aug 2025 – Oct 2025**
- Designed a configurable two-level cache simulator (L1/L2) in C++ using command-line architecture parameters.
- Implemented write-back, write-allocate policies, LRU replacement, and dirty eviction tracking using bitwise tag/index extraction
- Debugged and resolved an issue where total reads were undercounted by isolating the discrepancy between read hits and trace-based read operations, improving result accuracy and validation consistency.
- Evaluated performance using SPEC CPU2006 memory access traces, measuring miss rates, memory traffic, and Average Access Time (AAT).
- Analyzed performance–area–energy tradeoffs using CACTI memory modeling to bridge architecture to hardware design insights.

C++ Branch Prediction Simulator **Ongoing**
- Developing a branch prediction simulator in C++ to model bimodal, gshare, and hybrid predictors with configurable parameters.
- Implementing 2-bit saturating counters, a global branch history register, and a chooser table for dynamic prediction accuracy.
- Running simulations using SPEC CPU2006 branch traces to measure misprediction rates and evaluate predictor performance.
- Using Makefile automation and Gradescope validation to ensure correctness and efficient runtime.
- Exploring pipeline control hazards and correlation-based prediction techniques in modern CPU microarchitecture.

Verilog-based CNN Accelerator with DRAM Integration **Ongoing**
- Developing a parameterized RTL CNN accelerator in SystemVerilog featuring a pipelined MAC array, on-chip SRAM buffers, and a DRAM controller for tiled feature-map access.
- Implementing fixed-point arithmetic, Leaky ReLU activation, and line-buffer–based convolution to optimize throughput and minimize off-chip bandwidth.
- Conducting synthesis and post-layout timing analysis to evaluate PPA tradeoffs, leveraging Synopsys Design Compiler and PrimeTime for constraint-driven optimization.

Accessible Communication System for Deaf Individuals **Jan 2025 – Apr 2025**
- Spearheaded the design and development of a dual-interface communication system, improving accessibility for the deaf, and enabling real-time interactions with hearing individuals.
- Engineered a custom **ESP32-based wristband** with an OLED display and a vibration motor to deliver real-time, categorized notifications via Wi-Fi.
- Implemented a **WebRTC**-based video calling platform that features real-time **Sign Language-to-Text** (using **CNN** and MediaPipe) and **Speech-to-Text** (using Vosk **API**) transcription.
- Integrated a custom Android app to **c**ategorize incoming notifications and transmit them to the wristband based on user-defined modes.

IoT-Enabled Fire Detection and Alert System **Aug 2024 - Nov 2024**
- Created a real-time, **IoT-based fire detection and alert system** using a **Raspberry Pi 3B+** and a **USB** camera.
- Leveraged a custom **HSV colour space model** to precisely pinpoint fire regions based on predefined thresholds.
- Deployed an alert system that triggers an alarm, acquires geolocation data, and transmits real-time alerts to a designated webpage, specifying the fire's exact location.

RESEARCH AND PUBLICATIONS

IoT-Enabled Fire Detection and Alert System Leveraging HSV Thresholding.
- **Publication:** *Journal of Ubiquitous Computing and Communication Technologies*, Vol. 6, Issue 4, December 2024, pp. 338–352.
- IoT-Enabled Fire Detection and Alert System Leveraging HSV Thresholding | IRO Journals