

Shirazush Salekin Chowdhury

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SUMMARY

- Industrially experienced in the complete flow of Analog Mixed-Signal IC design and verification, including block to top-level design, GDS generation, physical verification (LVS, DRC, EM, IR), and tape-out using commercial EDA tools.
- Experienced in designing high-performance neuromorphic circuits for AI/ML applications.

RESEARCH AREA

Analog Mixed-Signal Integrated Circuits, Neuromorphic Computing, AI Hardware Accelerator, and In-Memory Computing.

EDUCATION

Doctor of Philosophy, Electrical Engineering, Virginia Tech, USA, CGPA: 4.00/4.00 Aug 2023 — Present

Coursework: Advanced Analog Integrated Circuits, Advanced Machine Learning.

Master of Science, Electrical and Electronic Engineering, AIUB, Bangladesh, CGPA: 4.00/4.00 Jun 2019 — Apr 2021

Coursework: Semiconductor Materials and Hetero-structures, Quantum Phenomena in Nanostructures, Power Electronics.

Bachelor of Science, Electrical and Electronic Engineering, AIUB, Bangladesh, CGPA: 4.00/4.00 Jan 2016 — May 2019

Coursework: VLSI Circuit Design, Digital Design I and II, Analog and Digital Circuit Designs, Signals and System, Control Systems.

ACADEMIC EXPERIENCE

Graduate Research Assistant, MICS and BRICC Lab, Electrical Engineering, Virginia Tech May 2024 — Present

- Next-generation low-power, high-performance neuromorphic computing solutions.
- RF Integrated Circuits (RFIC).

Graduate Teaching Assistant, Electrical Engineering, Virginia Tech Aug 2023 — May 2024

- Conducted courses titled Digital Design - I, and Intro to ECE Concepts.

INDUSTRIAL EXPERIENCE

Senior Engineer Aug 2019 — Jul 2023

Globalfoundries DTCO (ODC)

Circuit & System Design Department, Ulkasemi Pvt. Ltd.

Dhaka, Bangladesh

- Analog Circuit Design and Layout.
- Custom Mixed-Signal IC Layout Design.
- Standard Cell Library Development.
- Hardware and Programming: Python, Bash, SKILL, and Verilog.

PROJECTS

- **Image Classification AI Chip using Delay Feedback Reservoir Computing (DFR) in GF22FDX Technology:** Developed a DFR chip capable of character recognition in 2.03 μ s with a power consumption of only 7.5 mW RMS. Achieved classification accuracies of 98.52% on the EMNIST dataset and 99.83% on the MNIST dataset.
- **Current Project:** High Frequency Analog Front End (AFE) of MEMS indirect Time-of-Flight (iTOF) for Eye Tracking.
- **PLL Design for Frequency Generation [Github]:** Designed a low-power PLL (200 MHz to 1.6 GHz, 1.2V) with 507-873 ns settling time and 110.5-215.3 μ W power across PVT variations.
- **Bandgap Reference Circuit Design [Github]:** The Bandgap Reference operates at 1.8V, provides 1.06V output, with ± 34.3 ppm/ $^{\circ}$ C temp. coefficient, consumes 365.6 μ W, and functions from -40° C to 125° C.
- **Delta-Sigma Modulator Circuit Design [Github]:** The Delta Sigma Modulator, built in 55nm technology with RVT devices, operates at 1.2V, supports 10KHz to 50KHz, uses 600mV reference voltage, 5-10MHz clock speed, 10 μ A reference current, and has 1-bit resolution.

RECENT TAPE-OUT EXPERIENCE

- Taped-out an Image Classification AI Chip based on Delay Feedback Reservoir Computing (DFR) using GF22FDX technology. This work includes mixed signal circuit design and custom top level chip layout.
- High Frequency Analog Front End of MEMS indirect Time-of-Flight (iTOF) for Eye Tracking [Ongoing - expected tape-out in Jan-25]

SELECTED PUBLICATIONS

1. **Chowdhury, S. S.,** Sarkar, M. R. & Yi, C. Y. *Energy-Efficient Reconfigurable MRAM-Enabled Delay Feedback Reservoir Computing at the Edge.* [Submitted in IEEE TCAS-II]. 2024.
2. Sarkar, M. R. et al. *An In-Memory Power Efficient Computing Architecture with Emerging VGSOT MRAM Device in 2024 IEEE International Symposium on Circuits and Systems (ISCAS)* (2024), 1–5.
3. **Chowdhury, S. S. &** Arifin, F. *The Effects of the Substrate Doping Concentrations on 6H-SiC Nano-Scale ggNMOS ESD Protection Device in 2021 2nd International Conference on Robotics, Electrical and Signal Processing Techniques (ICREST)* (2021), 329–333.