Sharan Naribole

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SUMMARY

Wireless Systems Engineer at Apple specializing in Wi-Fi C++ protocol and device modeling, software architecture and end-to-end performance evaluation. Interested in wireless software engineering roles leveraging embedded systems expertise and wireless domain knowledge.

EXPERIENCE

Apple Inc. — Cupertino, CA

Wireless Systems Engineer (Platform Architecture) — *Mar 2021 – Present*

- Implemented various Wi-Fi protocols, device constraints, and algorithms in Apple's C++ network simulator.
- Conducted end-to-end performance analysis for key Apple use cases utilizing real-world measurements.
- Led Wi-Fi models testing and validation including debugging, bug reports and postbacks to open source ns-3.
- Built Python/C++ analysis tooling for simulation data processing and visualization; automated performance regression testing workflows for protocol development cycles.

Samsung Semiconductor Inc. — San Jose, CA

Senior Software Engineer, US Connectivity & Wi-Fi Systems — *Mar 2018 – Mar 2021*

- Designed Wi-Fi MAC algorithms for Firmware; implemented 802.11ax/be features in ns-3 simulator.
- Conducted large-scale wireless performance studies for 802.11ax OFDMA operation across diverse network topologies.
- Designed and presented technical contributions in IEEE 802.11 task groups on multi-link operation and power save.

Rice University — Houston, TX

Research Assistant, Rice Networks Group — *Aug 2012 – Mar 2018*

- Implemented hybrid Visible Light + Wi-Fi WLAN at MAC layer; engineered RF feedback/ACK control channels with precise timing constraints and state machine implementation.
- Developed 60 GHz multicast protocols with fast beam training using codebook traversal; evaluated on mmWave hardware testbeds with comprehensive performance analysis.
- Performed wireless packet/PHY trace analysis and built reproducible Python/C++ tooling for performance anomaly detection and system optimization.

EDUCATION

Rice University — Houston, TX

Ph.D., Electrical & Computer Engineering — *Mar 2018*

- **Area of study:** 60 GHz communication, Visible light communication, Light-Radio WLANs
- **Dissertation:** "Enhanced WLAN Performance with New Spectrum at 60 GHz and Visible Light"

Rice University — Houston, TX

M.S., Electrical & Computer Engineering — *May 2014*

- **Area of study:** Heterogeneous cellular networks, Service quality management, Statistical Learning
- **Thesis:** "Small Cells and Mobile Clients: a Measurement Study of an Operational Network"

Indian Institute of Technology Kharagpur — Kharagpur, India

B.Tech. (Honors), Electronics & Electrical Communication Engineering — *May 2012*

- IIT JEE 2008 All India Rank 312 (99.9 percentile)

Other Relevant Projects

STM32 FreeRTOS IoT LED Controller with ESP8266 Wi-Fi Bridge | *STM32F407, ESP8266* 2025
- Designed and implemented complete IoT system combining STM32F407 running FreeRTOS with ESP8266 Wi-Fi module; created dual-UART architecture with thread-safe logging (dedicated print task), software watchdog for deadlock detection, and stream buffer-based UART RX achieving zero CPU polling overhead.
- Optimized memory utilization through heap/stack profiling and buffer tuning; implemented 802.11 like UART retry logic improving command success rate.

Bare-Metal ARM Cortex-M4 Cooperative Scheduler | *STM32F407, ARM Assembly* 2025
- Built cooperative task scheduler from scratch using SysTick and PendSV exception handlers for context switching; implemented per-task Process Stack Pointer (PSP) management, READY/BLOCKED state machine, and register save/restore in ARM assembly without HAL dependencies.
- Demonstrated multi-task LED blinking at independent frequencies with precise timing.

WLAN Indoor Localization System | *Machine Learning, Signal Processing* 2017
- Developed passive indoor localization using Wi-Fi fingerprints from 500+ access points; achieved 95%+ accuracy through advanced preprocessing including outlier detection, feature normalization, and dimensionality reduction.

Deep Reinforcement Learning Trading System | *PyTorch, TensorFlow* 2025
- Built Deep Q-network trading agent with custom feature engineering and technical indicators; implemented advanced training techniques including experience replay, target networks, and epsilon-greedy exploration strategies.

Technical Skills

Wireless & Simulations: ns-3 simulator, MATLAB, Wi-Fi 802.11 (ax/be/bn), MLO, EMLSR, MIMO, OFDMA.

Programming Languages: C, C++, Python, Bash/shell scripting, ARM assembly.

Firmware Development: Embedded C, device drivers, hardware bring-up, system-level API design, ARM SoCs.

Software-defined radios: USRP, WARP, custom millimeter wave SDRs, ESP8266, etc.

Peripherals & Interfaces: GPIO, UART, SPI, I^{2}C, Timers/PWM/ADC, DMA.

RTOS: FreeRTOS task scheduling and synchronization, context switching, stack/heap management, debugging.

Debug & Test Tools: Wireshark, SEGGER SystemView, logic analyzers, hardware/software integration testing.

Development Tools: Git, command line toolchain, VS Code, MATLAB, Xcode, Claude Code.

Machine Learning: PyTorch, TensorFlow, Keras, scikit-learn, NumPy, pandas, matplotlib, seaborn, SQL.

Professional Achievements

Patents: 10+ granted patents for wireless device algorithms and multi-link operation (2021-2023)

Publications: 10+ peer-reviewed publications at top IEEE/ACM conferences.

Internships: NEC Labs America (2015), AT&T Labs Research (2013), Universität Paderborn Germany (2011)

Scholarships: Texas Instruments Fellowship (2012-2017); NSF Travel Grants; DAAD WISE scholarship

Selected Publications

"Multi-Channel Mobile Access Point in Next Generation IEEE 802.11be WLANs," *IEEE ICC*, 2021.

"Simultaneous Multi-Channel Downlink Operation in Next Generation WLANs," *IEEE GLOBECOM*, 2020.

"Scalable Multicast in Highly-Directional 60 GHz WLANs," *IEEE/ACM Transactions on Networking*, 2017.

"Impact of MU EDCA channel access on IEEE 802.11ax WLANs," *IEEE VTC Fall*, 2019.