



Exponent[®]
Engineering & Scientific Consulting

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Professional Profile

As an electrical engineering professional, Dr. Maralani has been practicing, teaching, and providing innovative solutions for more than 20 years in various areas including semiconductor devices, a wide range of circuits and systems (analog, mixed-signal, digital, and power electronics), electronic product definition and design, manufacturing, and testing. He is an experienced engineer of new technologies and aims to develop advanced circuits, power electronics, and products for greater power density and energy efficiency for various applications by using standard or wide bandgap semiconductor devices such as Silicon Carbide (SiC) and Gallium Nitride (GaN). Dr. Maralani is:

- Experienced in serving as a Principal Investigator (PI) and Co-Investigator by contributing individually and collaboratively, mentoring individuals, and managing the awarded projects from both government (e.g., NASA, DOE, Sandia National Labs, and DARPA) and industrial sponsors (including Siemens, Fuji, and Nissan).
- Experienced in teaching electrical and electronics engineering courses, e.g., Components and Circuits Lab, Analog Circuit Design, Linear Electronic Systems, and Digital Circuits and Systems.
- Experienced in design and simulation of analog/mixed-signal/digital circuits and systems using various schematic editors, simulators, and layout tools.
- Experienced in design and implementation of a highly dense and efficient SiC based power electronics (e.g., SiC based inverter design toward 30 kW/liter goal). Experienced in design and development of gate drivers in proximity to SiC power transistors.
- Experienced in design, fabrication, and testing of wide bandgap semiconductor-based Integrated Circuits (ICs) for power electronics and harsh environment applications.
- Experienced in testing and characterization of semiconductor devices and circuits at room and elevated temperatures (up to 625 °C) using a variety of lab test equipment and instruments.
- Experienced in device modeling with and without using programming languages to facilitate simulations.
- Experienced in design of power management systems and architectures that input multiple power sources to maximize a portable unit's operating run-time.
- Experienced in design and development of sensing and power management circuits and systems for various applications including wearable sensing circuits and systems on stretchable and flexible substrates.
- Experienced in design and development of digital circuits and systems (including FPGA based designs) along with development of their programming and firmware.
- Experienced in design and manufacturing of access control systems by utilizing microprocessors and microcontrollers at the core of the designs.
- Experienced in design and manufacturing of digital audio recorder/player systems.
- Experienced in designing Printed Circuit Boards (PCBs) and Direct Bonded Copper (DBC) substrates using layout tools. Experienced in fabrication of PCBs in the PCB fabrication/production facility.
- Experienced in manual precision soldering and trained individuals to solder and assemble PCBs and

- cables with various data rates and frequencies.
- Experienced in inspection and testing products in the lab and maintaining quality controls. Experienced in identifying and fixing production line problems.

Academic Credentials & Professional Honors

Ph.D., Electrical Engineering, Mississippi State University, 2009

M.S., Electrical Engineering, Pennsylvania State University, 2005

B.S., Electrical Engineering, University of Tabriz, Iran, 1998

Assistant Scientist & Lecturer, Electrical Engineering, University of California, San Diego (2014-2018)

Assistant Scientist, Electrical Engineering, University of California, Berkeley (2011-2014)

Licenses and Certifications

Certified IPC Specialist (CIS)

Prior Experience

Assistant Scientist, PRIME Systems Laboratory, University of California, San Diego

Lecturer, Electrical and Computer Engineering, University of California, San Diego

Assistant Scientist, Berkeley Sensor and Actuator Center (BSAC), University of California, Berkeley

Research Assistant, Center for Advanced Vehicular Systems (CAVS), Mississippi State University

Design Engineer, Cypress Semiconductor

Design Engineer, SemiSouth Laboratories

Electronics Engineer, Tyco Electronics

Professional Affiliations

Senior Member of the Institute of Electrical and Electronics Engineers (IEEE)

Publications

A. Maralani et al., "Towards Integrated Pressure Sensors for Temperatures up to 600 °C," Journal of Microelectronics and Electronic Packaging, vol. 13, no. 4, pp. 163-168, Nov. 2016.

A. Maralani et al., "Towards Integrated Sensors for Environments with Temperatures up to 600°C," Proceedings of the IMAPS, High Temperature Electronics (HiTEC), May 2016.

A. Maralani et al., "Silicon Carbide Transistors for IC Design Applications up to 600 °C," International Conference on Silicon Carbide and Related Materials, Oct. 2013.

A. Maralani et al., "Vertical Channel Silicon Carbide JFETs Based Operational Amplifiers," European Conference on Silicon Carbide and Related Materials, Sep. 2012.

A. Maralani et al., "The Design of an Operational Amplifier Using Silicon Carbide JFETs," IEEE Transactions on Circuits and Systems I, vol. 59, no. 2, pp. 255-266, Feb. 2012.

A. Maralani et al., "Design of a Silicon Carbide JFET Based Operational Amplifier for Gain and CMRR Performance," IEEE International Symposium on Circuits and Systems (ISCAS), May 2009.

A. Maralani et al., "Characterization and Modeling of SiC LTJFET for Analog Integrated Circuit Simulation and Design," European Conference on Silicon Carbide and Related Materials, Sep. 2008.

Presentations

A. Maralani, "Wide Bandgap Semiconductor Devices and Circuits for Power Electronics and Harsh Environment Sensing," Department of Electrical and Computer Engineering, U.C. San Diego, Seminar, Apr. 2016.

A. Maralani, "Wide Bandgap Material and Devices for Power, Energy, and Harsh Environment Sensing," Center for Energy Research, U.C. San Diego, Seminar, Mar. 2016.

A. Maralani, "SiC Semiconductor Devices and ICs as Gate/Base Drivers in Power Electronics," Berkeley Sensor and Actuator Center, U.C. Berkeley, BSAC Research Review and IAB, Sep. 2013.

A. Maralani, "SiC Semiconductor Devices and ICs for Power Management and Harsh Environment Sensing Applications," Fairchild Semiconductor, Seminar, May 2013.

A. Maralani, "Silicon Carbide Semiconductor Devices and ICs for Harsh Environment Sensing," Berkeley Sensor and Actuator Center, U.C. Berkeley, BSAC Research Review and IAB, Mar. 2012.

A. Maralani, "Design of Silicon Carbide JFET Based Operational Amplifiers," Berkeley Sensor and Actuator Center, U.C. Berkeley, BSAC Technology Seminar, Dec. 2010.

A. Maralani, "An Overview of Various Operational Amplifiers and their Applications in Analog Mixed Signal ICs," Brookhaven National Laboratory, Seminar, Apr. 2009.

Project Experience

At Exponent, Dr. Maralani has conducted power electronics performance and design evaluation (both in low-power and high-power sides) along with failure detection and root cause analysis at the system, circuit, and semiconductor device levels. To support the effort, he has developed custom test setups and performed characterizations, modeling, and simulations. Some of his past projects at Exponent include:

- Electric scooters from various manufacturers
- DC to DC converters and optimizers
- Lithium-ion batteries and power supplies including high power density modules
- Battery management systems
- Battery tester systems

Peer Reviewer

IEEE Circuits and Systems Society

IEEE Power Electronics Society

Silicon Carbide and Related Materials

International Microelectronics Assembly and Packaging Society