BAHA ERIM UZUNOGLU

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Analog Design | Precision Signal Chains & MEMS

Ph.D. researcher targeting analog / mixed-signal IC design, with experience in low-noise sensor interfaces, programmable gain, optical readout, and long-term MEMS drift compensation.

EDUCATION

Ph.D., Electrical and Computer Engineering | NC State University *2022 - Present*
Expected December 2026; advisor: Amay J. Bandodkar

M.S., Electrical and Electronics Engineering | Bilkent University *2019 - 2022*

B.S., Electrical and Electronics Engineering | Bogazici University *2014 - 2019*

Relevant coursework: Analog Electronics; CMOS VLSI Design; Power Management Integrated Circuits; Medical Instruments.

TECHNICAL SKILLS

Circuits and systems: Low-noise front ends; programmable gain; photodiode readout; calibration; capacitive sensing.

Design and simulation: Cadence, LTspice, COMSOL; Altium and KiCad; rigid/flex PCB design.

Programming and hardware: Python, MATLAB, C/C++; I2C/SPI/UART; microsoldering; wirebonding.

SELECTED IC DESIGN PROJECT

Energy-Harvesting Boost-Converter PMIC Redesign *ECE 734, NC State*

· Completed a course project redesigning the boost-converter PMIC described by Shrivastava et al. (*IEEE JSSC*, 2015) for thermoelectric and solar energy harvesting.

· Reference architecture: **inductor peak-current control and zero detection**, with cold-start and RF-assisted kick-start circuitry.

ANALOG HARDWARE & RESEARCH EXPERIENCE

Graduate Researcher | North Carolina State University *Aug 2022 - Present*

· **Analog front ends:** Designed low-noise sensor-interface circuits and programmable-gain stages on custom rigid and flexible PCBs for optical, electrochemical, haptic, and neural-interface systems.

· **Optical signal chains:** Built controlled-LED illumination and photodiode-readout systems; developed Python routines for intensity mapping, calibration, and feature normalization.

· **Analog signal conditioning:** Prototyped an EMG muscle-contraction detector and neural-interface analog blocks using filtering, envelope extraction, and onboard threshold logic.

· **Mixed-signal system integration:** Wrote C/C++ I2C/SPI/UART sensor drivers, interrupt-driven low-power firmware, and BLE/UART streaming on MSP430, nRF52, and ESP32.

· **Cross-disciplinary collaboration:** Worked with physicists, chemists, biologists, veterinarians, and medical doctors on sensor and bioelectronics research.

Graduate Researcher | Bilkent University *Jul 2019 - Jul 2022*

· Designed and tested a **MEMS ring gyroscope with on-chip capacitive stress sensors** for drift compensation; evaluated long-term performance over a **16-day zero-rate test**.

· Published stability of **0.008 degrees/hour at two-day averaging** in mismatched mode, demonstrating stress-based compensation of long-term gyroscope drift.

INDUSTRY & TEACHING

ASELSAN | Avionic Hardware R&D Intern *Aug - Sep 2018*
Designed SPI/UART communication circuits and supported embedded debugging.

Arcelik | Human-Machine Interfaces R&D Intern *Jul - Aug 2017*
Designed hardware for a wirelessly powered capacitive-sensing LED indicator.

Teaching Assistant | Microelectronics (NC State); Electronic Circuit Design (Bilkent)
Supported labs, course projects, grading, and tutoring. *NC State: 2022-2023; Bilkent: 2019-2022.*

SELECTED FIRST-AUTHOR PUBLICATIONS

B. E. Uzunoglu, D. Erkan, E. Tatar. "A Ring Gyroscope With On-Chip Capacitive Stress Compensation." *JMEMS* 31(5), 741-752, 2022.

B. E. Uzunoglu et al. "Multimodal, wearable sensors with tactile communication capabilities for human and robotic applications." *Device*, 101245, 2026.