Wireless Implant & IC Design Researcher github.com/avekan33 averal@berkeley.edu avekan33.github.io

EDUCATION

University of California, Berkeley	August 2021 - Present
Ph.D. in Electrical Engineering & Computer Sciences	GPA: 4.0 /4.0
Advisors: Professor Ali M. Niknejad, Professor M. Mekhail Anwar (UCS	(F)
University of California, Berkeley	June 2020 - August 2021
M.S. in Electrical Engineering & Computer Sciences	GPA: 4.0 /4.0
Thesis: Harnessing Alpha Radiation to Power Miniaturized Implantable	Medical Devices
University of California, Berkeley	August 2016 - May 2020
B.S. in Electrical Engineering & Computer Sciences GPA:	3.97 /4.0; Highest Honors

Selected Coursework: ADCs (A+), RFICs (A+), Advanced Analog ICs (A), Advanced Digital ICs (A+), DSP (A+), Machine Learning (A), Optimization (A+), Power Electronics (A), Computer Architecture (A), Probability & Random Processes (A), MEMS (A+), Feedback & Control (A)

Research

UCSF & Berkeley Wireless Research Center (BWRC)

June 2020 - Present

June 2019 - May 2020

 $Graduate\ Student\ Researcher$

- Taped out BASE-Hub, an implantable SoC providing chronic power, data storage, and communication for multiplexed "plug and play" sensing in X-FAB 180 nm, testing ongoing. BASE-Link, the inductive power and data transfer setup for this system, is in design.
- Journal publication pending on the use of alpha radiation to power medical implants via phosphorescent light generation and subsequent light capture by photovoltaic arrays.

UC Berkeley Swarm Lab

 $Undergraduate\ Student\ Researcher$

- As a member of Prof. Michel Maharbiz's bio-focused research group, I investigated the effect of "anchor loss" in ultrasonic energy harvesting by piezoelectric crystals at mm-scale, with the end goal of developing smaller medical implants for deeper implantability.
- Assembled a low-noise data acquisition and control system with a Python GUI, writing Verilog descriptions for an FPGA signal controller and designing PCBs.

Course Projects

2023-**EE240C**: 14-bit, 30 MS/s Pipeline ADC Model @ 1.2 V, 72 dB DR, 65 dB SNDR in 45 nm. 2021-**EE241B**: Wide Tuning Range All-Digital Phase-Locked Loop w/ Fine Res. in Pred. 7 nm. 2020-**EE240B**: Switched-Capacitor Gain Stage with 64 dB DR @ 150 MHz. **EE123**: An optimized JPEG-like image compression algorithm and AFSK communication protocol in **Python**.

2019-CS152: C++ branch predictor based on the Gshare scheme. EEC128: State feedback with a Luenberger observer to achieve a self-erecting inverted pendulum.

2018-EECS151: Three-stage pipelined RISC-V CPU (with forwarding) in Verilog with FPGA audio and visual peripherals. EE140: LCD Display Driver Amplifier in 45 nm.

PUBLICATIONS

 S. Sonmezoglu, A. Darvishian, K. Shen, M. J. Bustamante, A. Kandala and M. M. Maharbiz, "A Method and Analysis to Enable Efficient Piezoelectric Transducer-Based Ultrasonic Power and Data Links for Miniaturized Implantable Medical Devices," in *IEEE Transactions on Ul*trasonics, Ferroelectrics, and Frequency Control, 2021.

Awards

National Science Foundation (NSF) Graduate Research Fellowship	2020
Stipend of \$34,000 and tuition allowance of \$12,000 for three out of five fellowship years.	
Elena Catelli and Kenneth Leung Memorial Scholarships	2016

Gift awards for academic excellence in Italian and future study of electrical engineering.

TEACHING

Microelectronic Devices & Circuits (EE105) Graduate Student Instructor	Fall 2023, Spring 2020 Evaluation: 4.67/5.0
• Lead TA responsible for admin., homework, and discussion section	instruction and content.
Great Ideas in Computer Architecture (CS61C)	Fall 2019
Undergraduate Student Instructor	Evaluation: $4.28/5.0$
• Taught one discussion and one laboratory section per week, staffed	l office hours.
Discrete Mathematics & Probability Theory (CS70) Academic Intern	Summer 2019
• Answered questions and facilitated discussion in five office hours see	ections per week.
Industry	

Samtec Optical Group	Summer 2018
Electrical Engineering Intern	Santa Clara, CA
• Assembled list of testing criteria and designed a verification	n setup for optical cable firmware.

• Assistant for optical link R&D projects, running BER and eye-diagram tests.

Elevety, Inc.

Hardware/Software Integration Intern

Summer 2017 Toronto, ON, Canada

- Designed a series of interactive Python scripts to automate production testing for the Domio Helmet Audio unit.
- Played a major role in the design and assembly of a demo version of the Hearshot Coach product for use in testimonial film and consumer outreach.

OUTREACH

Pioneers in Engineering

Hardware Advisor, Sensor Team Project Manager

- Mentored new staff and led engineering workshops for PiE's high school robotics competitions.
- Directly supervised staff and was responsible for maintaining PCB CAD designs and facilitating assembly of sensor boards as Project Manager.

August 2016 - May 2020 Berkeley, CA