Debjit Sarkar

California Institute of Technology
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Education

California Institute of Technology — Pasadena, CA
Ph.D. in Electrical Engineering, GPA: 4.0/4.0, Advisor: Prof. Ali Hajimiri — Sept. 2020 – June 2026
M.S. in Electrical Engineering, GPA: 4.0/4.0, Advisor: Prof. Ali Hajimiri — Sept. 2020 - June 2022
University of Michigan - Ann Arbor — Ann Arbor, MI
B.S. in Electrical Engineering, *summa cum laude* — Sept. 2017 - Dec. 2019

Experience

California Institute of Technology — Pasadena, CA
Graduate Researcher, Caltech High-Speed Integrated Circuits Group — Sept. 2020 - Present

- Integrated photonics in bulk CMOS:
  - Developed a monolithic integrated photonics platform in bulk CMOS over 15+ tapeouts spanning 180 and 65 nm bulk CMOS to 22 nm FDSOI CMOS. Designed and measured components like ring-resonators and grating couplers and systems like the following:
  - **Monolithic optical clock distribution in bulk CMOS**
    - Presented the first demonstration of a monolithic optical clock distribution network in a bulk CMOS chip by integrating photonic waveguides, avalanche photodiodes, and transimpedance amplifiers in the same chip. Electronic and photonic design was done using Cadence Virtuoso and ANSYS Lumerical, respectively.
    - Achieved the most advanced CMOS node to support photonic waveguiding to date, without design rule violations or semiconductor process modifications.
    - Demonstrated ~100x decrease in waveguide bend radius versus the original geometry.
  - **Monolithic IQ optical coherent receiver in bulk CMOS**
    - Designed the photonic and opto-electronic front-end of an integrated optical coherent receiver for LIDAR. Introduced the first optical modulator in bulk CMOS.
  - Mentored and managed 5+ undergraduate and graduate students across multiple projects.
- Digital beamforming in optical phased arrays:
  - **Monolithic 26k element optical phased array in bulk CMOS with digital beamforming**
    - Designed and taped out a fully integrated 2D optical phased array with 1D beam steering, including 100+ column ADCs and digital control and readout *(measurement in progress)*.
  - Demonstrated digital beamforming in a silicon photonics platform for the first time.
- Assisted with grant writing; performed wet etching and biosafety level 1 work, cleanroom trained.

U.S. Naval Research Laboratory — Washington, D.C.
Electronics Engineer II, Tactical Electronic Warfare Division — Feb. 2020 - Sept. 2020

- Designed nonlinear microwave metamaterials using multiconductor transmission line theory in Matlab and electromagnetic simulations in Keysight ADS.

University of Michigan Radiation Laboratory (RADLAB) — Ann Arbor, MI
Undergraduate Researcher, Grbic Group — Mar 2018 - Dec. 2019

- Analyzed, designed, and measured X-band serrodyne frequency translators. Results were experimentally verified using standard microwave measurement equipment.

Selected Publications

D. Sarkar, D. Baum, and A. Hajimiri, "Monolithic Optical Clock Distribution in Bulk CMOS using I-Beam Waveguides," *2025 IEEE Symposium on VLSI Technology and Circuits*, Kyoto, Japan, 2025.

V. Gurses*, **D. Sarkar*,** A. Khachaturian, R. Fatemi, and A. Hajimiri, "A large-scale coherent imager with digital beamforming," *2024 Conference on Lasers and Electro-Optics (CLEO)*, San Jose, CA, 2024 *(*equal)*.

D. Sarkar and A. Hajimiri, "Visible Spectrum Waveguiding in Bulk CMOS," *Optics Express* 31, 42365-42372, 2023.

C. Ives, **D. Sarkar,** and A. Hajimiri, "Subtractive Photonics in Bulk CMOS," *IEEE Journal of Solid-State Circuits (JSSC)* 58 (11), 3030-3043, 2023.

Awards

National Science Foundation Graduate Research Fellowship (NSF GRFP)	2020
Institute Fellowship - California Institute of Technology	2020
EECS Outstanding Research Award - University of Michigan	2020

Teaching and Service

California Institute of Technology, Pasadena, CA

Graduate Research Mentor	Feb. 2022 - Present
Graduate Teaching Assistant (EE 44, EE 114)	Sept. 2023 - June 2024
Reviewer for Transactions on Electron Devices	2023

University of Michigan - Ann Arbor, Ann Arbor, MI

Office of National Scholarships/Fellowships, NSF Peer Mentor	Apr. 2020 - Apr. 2022
Tau Beta Pi - Michigan Gamma, K-12 Outreach	Sept. 2018 - Dec. 2019
College of Engineering Student Advisory Board Member	Sept. 2017 - Dec. 2019