

# Akshit Agarwal

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## Education

- Sep 2023 - **California Institute of Technology**  
Present MS in Electrical Engineering, GPA: 3.9  
(Graduating Dec 2024) **Coursework** - Advanced Photonics and Lasers Lab, Robotics, Nanotechnology, Signals and Transforms
- Sep 2019 - **University of California San Diego**  
Dec 2022 BS in Electrical Engineering with Minor in Economics, GPA: 3.981 with Summa Cum Laude  
**Academic Honors** -  
○ Henry G. Booker Award recipient  
○ Tau Beta Pi Scholarship recipient for CA Psi Chapter  
○ Tau Beta Pi Engineering Society member (available only to students in top 12.5% of the class)  
○ Provost Honors for academic performance for 8 academic terms  
**Coursework** - Analog and Digital IC Design, RF Circuit Design, Feedback Systems Design and Analysis, LTI System Analysis, Control Theory, C/C++ programming, Electromagnetism

## Technical Skills

### Programming

C C++ Python Verilog System Verilog MATLAB Arduino C ROS

### Design and Simulation

Eagle PCB Altium LTSpice Cadence Virtuoso Cadence Spectre Keysight ADS Ansys HFSS  
SolidWorks

## Research and Professional Experience

- Feb 2023 - **Research and Development Engineer, UCSD Qualcomm Institute**  
Jul 2023 **Adviser:** Dinesh Bharadia  
○ Developed a novel system for signal agnostic Angle of Arrival (AoA) estimation for RF signals in the sub 6 GHz spectrum.  
○ Performed Ansys HFSS and MATLAB simulations for designing antenna arrays for wideband performance.  
○ Integrated and synchronized hardware like SDRs and control boards with host software for signal detection and AoA estimation.
- Feb 2021 - **Undergraduate Researcher, UCSD Energy-Efficient Microsystems Lab**  
Dec 2022 **Adviser:** Patrick Mercier  
○ **Wi-Fi backscatter Tag:**  
- Designed, implemented, and validated performance of a new architecture to improve range and wake-up times of Wi-Fi backscatter systems through a discretely implemented backscatter tag.  
- Optimized power and area for layout of hardware blocks like antenna arrays and sensing circuitry on a PCB.  
- Utilized Verilog coding to implement functional blocks like clocking, UART and controls on CMOD FPGAs.  
- Automated data collection process using Python scripts for validation and debugging, leading to a faster validation process.  
○ **Bio-Fuel Cell (BFC) Touch sensor:**  
- Investigated the use of BFCs as a power source for health and Bluetooth applications using a custom PCB.  
- Designed a minimally sized PCB integrating a COTS Boost Converter and Bluetooth Module along with required interfacing components.  
- Utilized TI BLE5 software stack for Bluetooth advertising.

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## Projects

Nov 2022 - **Operational Transconductance Amplifier (OTA) Design**

- Dec 2022
- Designed a two-stage (folded cascode with common source), differential-to-single-ended amplifier with built-in biasing circuitry using TSMC 180nm technology.
  - Simulated the design in Cadence Virtuoso and achieved gain of 73dB, unity gain bandwidth of 31 Mhz and power consumption of 2.19mW.

May 2022 - **Custom Carry-Increment 8-bit Adder**

- Jun 2022
- Designed a custom architecture 8-bit, variable-length carry increment adder using GPDK045 45nm technology.
  - Simulated the design in Cadence Virtuoso and achieved a maximum operational frequency of 4 GHz and power consumption of 600uW.

Jan 2021 - **Chromotherapy Lighting System**

- Mar 2021
- Led a team of engineering students for an IEEE project to develop a Google Home based IoT device.
  - Programmed ESP32 modules to use chromotherapy principles and audio commands given by a user to dynamically adjust lighting conditions in a room to elevate user mood.

Jan 2021 - **Baboons on the Move**

- Jun 2021
- Improved efficiency and accuracy for detection on moving objects in a video to detect baboon movements in video clips for understanding movement patterns.
  - Used Python image processing concepts and packages like opencv to implement detection of objects.

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## Teaching and Mentoring Experience

Mar 2021 - **ECE Instructional Assistant, UCSD Jacob School of Engineering**

- Dec 2022
- Cultivated a comfortable learning environment for students for upper-division ECE course (ECE 101 – Linear System Fundamentals), received close to 100% recommendation over a period of six academic terms
  - Designed and graded assignments, conducted assessments and held office hours to facilitate learning

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## Publications

ISSCC 2023 S.-K. Kuo, M. Dunna, H. Lu, **A. Agarwal**, D. Bharadia, P.P. Mercier, "An LTE-harvesting BLE-to-WiFi Backscattering Chip for Single-Device RFID-like Interrogation" *IEEE International Solid-State Circuits Conference 2023*

arXiv M. Dunna, S.-K. Kuo, **A. Agarwal**, P.P. Mercier, D. Bharadia, "BeamScatter: Scalable, Deployable Long-Range backscatter communication with Beam-Steering" *Cornell University arXiv*