

Akshita Rao

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Education

PhD Candidate in Bioengineering

Stanford University

Advisor: Todd Coleman

Committee Members: Jamie Zeitzer (co-advisor), Scott Delp

2022 – 2027

Stanford, CA

MS in Bioengineering

Tufts University

Master's project title: Fabrication and Characterization of a Flexible Bioelectronic Scaffold Suitable for 3D Cell Cultures.

Advisor: Brian P. Timko

2021 – 2022

Medford, MA

BS in Mechanical Engineering and Biomedical Engineering

Tufts University

Thesis title: Multiplexed bioelectronic platforms for probing electrophysiology in cardiac and neural tissue models.

Advisor: Brian P. Timko

Committee Members: Lauren Black (chair), Srivalleesha Mallidi

2017 – 2021

Medford, MA

Research Experience

Graduate Student Researcher, Neural Interaction Lab

Prof. Todd P. Coleman, Department of Bioengineering, Stanford University

March 2022 – Present

Stanford, CA

- Analyzing human brain-body dynamics between gastric and cardiac signals and scalp EEG during sleep to characterize how visceral-neural coupling relates to sleep microarchitecture and downstream functional consequences for sleep quality and next-day cognitive performance.
- Supporting concussion assessment at the SPARCC concussion clinic by deploying Samsung Galaxy smartwatches and Samsung Health/Privileged SDKs to collect single-lead ECG and green PPG during an exertional protocol and maintaining AWS Lambda functions that process raw signals into autonomic metrics and clinician-facing reports.
- Quantifying dynamic facial function with machine learning algorithms to better diagnosis patients with facial palsy and improve clinician decisions for surgical intervention and other palsy therapies.

Graduate Student Researcher, CamLab

Prof. David Camarillo, Department of Bioengineering, Stanford University

January – March 2023

Stanford, CA

- Adapted a linear impactor to simulate rotational diffuse brain injuries biomechanically valid for TBI models.
- Validated a 3D linkage model using Denavit-Hartenberg parameters to achieve target angular velocity for simulating rotational brain injury.

Undergraduate Student Researcher, Timko Lab

Prof. Brian P. Timko, Department of Biomedical Engineering, Tufts University

Sep 2018 – May 2022

Medford, MA

- Fabricated and characterized a flexible multi-electrode array (FMEA) with >60% functioning electrode devices.
- Used electrochemical impedance spectroscopy and polymer deposition to improve electrode performance.
- Conducted microfluidic experiments with 32-channel MEAs to study hypoxia and ischemia in cardiomyocytes.

Undergraduate Fabrication Intern, Tufts Bray Labs

Ms. Marya Schnedeker, Department of Mechanical Engineering, Tufts University

June 2018 – May 2021

Medford, MA

- Performed material and machine testing to document and create training modules for shop equipment.
- Used rapid prototyping to fabricate products on shop equipment for Tufts students and faculty research projects.
- Trained students and faculty (150+ annually) on proper use of shop equipment and fabrication processes.

Undergraduate Student Researcher, Abedian Lab

Prof. Behrouz Abedian, Department of Mechanical Engineering, Tufts University

May – August 2020

Medford, MA

- Simulated mechanical behavior of colloidal particles in non-Newtonian fluid suspension and Brownian motion.
- Analyzed the effects of jamming, friction, and hydrodynamic resistance on particle pressure measurements.

Undergraduate Research Associate, DevTech Research Group

Prof. Marina Bers, Eliot-Pearson Department of Child Studies, Tufts University

Jan – August 2020

Medford, MA

- Identified performance errors in CRISPEE, a tangible tool for kids to learn concepts in bioengineering.
- Debugged hardware and software errors in CRISPEE to improve product usability for pilot testing in schools.

Honors and Awards

NIH Sleep and Circadian Neurobiology DataBlitz Nomination (ranked top 20 among 514 research abstracts)	2025
Wu Tsai Human Performance Alliance Research Fellowship, Wu Tsai Human Performance Alliance	2025
Stanford Graduate Fellowship in Science & Engineering, Office of the Vice Provost for Graduate Education	2025
NIH-NIGMS Molecular Biophysics Program Trainee	2023
National Science Foundation FAST-TRAC Scholarship Recipient	2022
Undergraduate Highest Thesis Honors, awarded by undergraduate thesis committee	2021
Mechanical Engineering Graduation Class Speaker, nominated by Tufts University School of Engineering	2021
De Florez Prize in Human Engineering, Tufts University	2020
Tufts Summer Scholar, Tufts University	2019

Publications

Rao AA; Fredericks M; Dresler M; Rebollo I; Zeitzer JM; Schoch SF; Coleman TP. Simultaneous stomach-brain electrophysiology reveals dynamic coupling in human sleep. *bioRxiv*. November 2025.

Rao AA; Greene JJ; Coleman TP. Dynamic Facial Analysis for Predicting Facial Palsy Outcomes: Comparing Landmark Detection Models and Integrating Ordinal Regression. Accepted to *IEEE Engineering Medicine & Biology Society*. July 2025.

Rao AA; Greene JJ; Coleman TP. Machine Learning Methods to Track Dynamic Facial Function in Facial Palsy. *IEEE Transactions in Biomedical Engineering*. May 2025.

Bolonduro OA; Zijng C; Yan-Ru L; **Rao AA**; Cote M; Liu H; Tzanakakis ES; Timko BP. An Integrated Optogenetic and Bioelectronic Platform for Regulating Cardiomyocyte Function. *Advanced Science*. July 2024.

Liu H; Bolonduro OA; **Rao AA**; Duffy BM; Huang Z; Black LD; Timko BP. Heart-on-a-chip Model with Integrated Extra- and Intra-cellular Bioelectronics for Monitoring Cardiac Electrophysiology under Acute Hypoxia. *Nano Letters*. April 2020. Selected for ACS Editors' Choice.

Bolonduro OA; Duffy BM; **Rao AA**; Black LD; Timko, BP. From Biomimicry to Bioelectronics: Smart Materials for Cardiac Tissue Engineering. *Nano Research*. February 2020.

Presentations

Oral Presentations:

Sleep Regulation and Function Gordon Research Seminar: Sleep Across Scales, Galveston, TX. March 2026.

Annual Stanford Center for Sleep and Circadian Sciences Retreat, Palo Alto, CA. February 2026.

Annual Stanford Bioengineering Department Research Symposium, San Jose, CA. September 2025.

47th Annual International Conference of the IEEE Engineering Medicine & Biology Society, Copenhagen, Denmark. July 2025.

Tufts Summers Scholars Conference, Medford, MA. August 2019.

Poster Presentations:

Rao AA; Fredericks M; Dresler M; Rebollo I; Zeitzer JM; Schoch SF; Coleman TP. *Simultaneous stomach-brain electrophysiology reveals dynamic coupling in human sleep*. Sleep Regulation and Function Gordon Research Conference, Galveston, TX. March 2026.

Rao AA; Fredericks M; Dresler M; Rebollo I; Zeitzer JM; Schoch SF; Coleman TP. *Simultaneous EEG-EGG recordings reveal dynamic stomach-brain coupling across NREM sleep*. Society for Neuroscience, San Diego, CA. November 2025.

Rao AA; Cote M; Timko BP. *Development and Characterization of a Bioelectronic Scaffold for 3D Tissue Integration*. Biomedical Engineering Society (BMES) Annual Conference, San Antonio, TX. October 2022.

Rao AA; Timko BP. *Fabrication and Characterization of a Flexible Bioelectronic Scaffold Suitable for 3D Cell Cultures*. Tufts Graduate Research Symposium, Medford, MA. May 2022.

Rao AA; Bolonduro OA; Liu H; Timko BP. *Heart-on-a-Chip Model with Integrated Bioelectronics for Monitoring Cardiac Electrophysiology under Acute Hypoxia*. American Chemical Society Spring Conference (virtual), Philadelphia, PA. March 2020.

Rao AA; Timko BP. *Heart-on-a-Chip Model with Integrated Bioelectronics for Monitoring Cardiac Electrophysiology under Acute Hypoxia*. Tufts Undergraduate Research Symposium, Medford, MA. October 2019.

Patents

Rao AA; Coleman TP. *Systems and Methods for Electrogastrographical Sleep Monitoring*. Patent pending (U.S. Provisional Application), filed November 2025.

Industry Experience

Systems Engineering Intern, Design Verification

Insulet Corporation

May – Aug 2022 & May – Jan 2021

Acton, MA

New Product Engineering Intern

Corvia Medical

May – August 2021

Tewksbury, MA

Tech Studio Program Assistant

Museum of Science, Boston

September 2016 – August 2019

Boston, MA

Teaching and Mentoring

Bioengineering Teaching Assistant Mentor

Stanford University

December 2024 – Present

Stanford, CA

Summer Tutor, Summer Academic Resource Center

Stanford University

June – August 2024 & 2025

Stanford, CA

- In addition to 1:1 tutoring, led the Academic Excellence Club (75 summer session students), a 3-part 2-hour seminar series, that covered concepts in professional development, scientific communication and academic productivity.

Course Instructor

Stanford University

Spring 2025

BioE 296: Promoting Effective & Equitable Teaching in Bioengineering

Stanford, CA

Graduate Teaching Assistant

Stanford University

Stanford, CA

BioE 230: Measurements, Statistics & Probability

Fall 2025

BioE 296: Promoting Effective & Equitable Teaching in Bioengineering

Spring 2024

Leadership in Inclusive Teaching Fellow

Center of Teaching and Learning, Stanford University

March 2023 – 2025

Stanford, CA

Peer Mentoring

Stanford University

September 2022 – Present

Stanford Engineering Research Introductions Outreach (SERIO) Mentor

Stanford, CA

Society of Women Engineers (SWE) Mentor

Graduate Teaching Assistant

Tufts University

Medford, MA

BME 011: Biomechanics

Fall 2021

ME 070: Instruments & Experiments

Spring 2022

Undergraduate Teaching Assistant

Tufts University

Medford, MA

ES 02: Computational Engineering (Introduction to MATLAB)

Spring 2020

BME 011: Biomechanics

Fall 2020

ES 07: Thermodynamics

Spring 2020, 2019

Service and Leadership

Summer Session Admissions Reviewer

Summer Academic Resource Center, Stanford University

October 2025 – Present

Stanford, CA

Bioengineering Student Admissions Committee Member

Stanford University

December 2024 – Present

Stanford, CA

- Review (50 applications) and interviewed 10 applicants for the Stanford Bioengineering PhD program.
- Attend and participate in meetings with faculty to debrief, advocate for students, and decide on acceptance.

Co-President of Bioengineering Graduate Student Association

Stanford University

March 2023 – Present

Stanford, CA

- Coordinate monthly student council meetings and quarterly meetings with department faculty and student services/DGS to plan and host events for community engagement.
- Organize and lead department activities during BioE Visit Days & Orientation Week.
- Led peer mentorship sessions to guide and prepare 2nd year Bioengineering PhD students for their qualifying exams.