Akshita Rao

akshitar@stanford.edu
290 Jane Stanford Way Rm S385, Stanford, CA 94305
https://arao21.github.io

Education

PhD Candidate in Bioengineering 2022 – 2027
Stanford University Stanford, CA
Advisor: Todd Coleman
Committee Members: Jamie Zeitzer (co-advisor), Scott Delp

MS in Bioengineering 2021 – 2022
Tufts University Medford, MA
Master's project title: Fabrication and Characterization of a Flexible Bioelectronic Scaffold Suitable for 3D Cell Cultures.
Advisor: Brian P. Timko

BS in Mechanical Engineering and Biomedical Engineering 2017 – 2021
Tufts University Medford, MA
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

Research Experience

Graduate Student Researcher, Neural Interaction Lab March 2022 – Present
Prof. Todd P. Coleman, Department of Bioengineering, Stanford University 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 January – March 2023
Prof. David Camarillo, Department of Bioengineering, Stanford University 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 Sep 2018 – May 2022
Prof. Brian P. Timko, Department of Biomedical Engineering, Tufts University 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 June 2018 – May 2021
Ms. Marya Schnedeker, Department of Mechanical Engineering, Tufts University 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 May – August 2020
Prof. Behrouz Abedian, Department of Mechanical Engineering, Tufts University 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 Jan – August 2020
Prof. Marina Bers, Eliot-Pearson Department of Child Studies, Tufts University 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; Zijing 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 Internation 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 — May – Aug 2022 & May – Jan 2021
Insulet Corporation — Acton, MA

New Product Engineering Intern — May – August 2021
Corvia Medical — Tewksbury, MA

Tech Studio Program Assistant — September 2016 – August 2019
Museum of Science, Boston — Boston, MA

Teaching and Mentoring

Bioengineering Teaching Assistant Mentor — December 2024 – Present
Stanford University — Stanford, CA

Summer Tutor, Summer Academic Resource Center — June – August 2024 & 2025
Stanford University — 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 — March 2023 – 2025
Center of Teaching and Learning, Stanford University — 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 — October 2025 – Present
Summer Academic Resource Center, Stanford University — Stanford, CA

Bioengineering Student Admissions Committee Member — December 2024 – Present
Stanford University — 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 — March 2023 – Present
Stanford University — 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.