

ANDREW SHO PERLEY

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Curriculum Vitae

EDUCATION

Stanford University PhD Student, Bioengineering	<i>Jul. 2021 - Present</i>
University of California, San Diego PhD Student, Bioengineering (transitioned to Stanford) Masters of Science, Bioengineering	<i>Sep. 2019 - Jul. 2021</i> GPA: 4.00
University of California, Los Angeles Bachelor of Science, Bioengineering, <i>Summa Cum Laude</i>	<i>Sep. 2015 - Jun. 2019</i> GPA: 3.95
Tohoku University Sendai, Miyagi Prefecture, Japan Study abroad	<i>Apr. - Aug. 2018</i>

ACADEMIC ACHIEVEMENTS

Bioengineering Departmental TA Award <i>Stanford University</i> <ul style="list-style-type: none">• Recognition granted to Teaching Assistants in the Bioengineering Department for exemplary work as an instructor.	<i>Jun. 2023</i>
Dean's Graduate Student Advisory Council JEDI Conference Travel Grant <i>Stanford University</i> <ul style="list-style-type: none">• Prestigious award to fund students in the School of Engineering doing work to push forward Justice, Equity, Diversity, and Inclusion.	<i>Jun. 2023</i>
Stanford Data Science Scholars Program <i>Stanford University</i> <ul style="list-style-type: none">• Stanford fellowship that brings PhD students and Postdocs from all departments across campus in order to discuss and share research involving data science. Scholar backgrounds include education, history, marine biology, geophysics, and more.• Organized the Stanford Data Science Conference with the scholars and program admin.	<i>Sep. 2022 - Present</i>
Stanford Leaders in Inclusive Teaching Program <i>Stanford University</i> <ul style="list-style-type: none">• Stanford fellowship that funds projects by PhD students dedicated to inclusive teaching and education practices and bringing them to the larger Stanford community• Collaborated with groups from varied departments (e.g., biology, history, mechanical engineering) to give and receive feedback on course and workshop ideas/implementations	<i>Sep. 2022 - Present</i>

Molecular Biophysics T32 Award

Sep. 2021 - Sep. 2022

Stanford University

- T32 training program aimed at training the next generation of scientists in Biophysics.

Integrative Bioengineering of Heart Vessels and Blood T32 Award *Sep. 2020 - Jul. 2021*

University of California, San Diego

- T32 training program funded by the NHLBI to train next generation Bioengineering scientists in cardiovascular technology development and research
- Focus on multi-scale integration of engineering principles applied to biological systems and subsystems for cardiovascular disease

San Diego Fellowship Matching Commitment

Sep. 2020 - Jul.2021

University of California, San Diego

- Matching funding for exceptional students nominated for training grants and who show commitment to promoting diversity within the campus and department

Powell Fellowship

Sep. 2019 - Sep. 2020

University of California, San Diego

- \$40,000 Fellowship awarded to select incoming 1st year Engineering PhD students based on potential for impactful research and academic nomination by department

Dean's Honor List

Fall 2015 - Fall 2017, Spring 2019

University of California, Los Angeles

- Honors Award for Student's who show exceptional academic excellence in a particular term.

RESEARCH EXPERIENCE

Stanford University

Jul 2021 - Present

University of California, San Diego

Sep. 2019 - Jul. 2021

Graduate Researcher

Principal Investigator: Todd Coleman

- Investigating the electrophysiological connection between the gut and brain by performing the first ever simultaneous intracranial EEG and electrogastrography recordings
- Performing simultaneous noninvasive electrophysiology experiments in patients with anorexia nervosa or avoidant/restrictive food intake disorder to understand how the coupling between the gut and brain contributes to varying forms of interoception and visceral hypersensitivity
- Investigating and developing multi-array wave analysis methods to understand the electrophysiology of the gut-brain axis in simultaneous gut and brain electrophysiology recordings by approximating joint statistics on spatiotemporal phase data
- Developed information theoretic signal processing methods for extracting cross frequency coupling and directed information measures between the gut and brain using gamma generalized linear models

- Developed statistical procedures for heartbeat dynamics to rigorously understand autonomic nervous system function
- Investigated electrophysiological signals in the gastrointestinal system in order to better understand gastric wave propagation and disease etiology with and without stimulation from invasive gastric pacing devices
- Developed state-space inference methods for high resolution time-frequency analysis of gastric electrophysiology in order to resolve very low frequency signals and estimate key parameters such as phase

University of California, San Diego

Graduate Researcher

Aug. 2020 - Jul. 2021

Principal Investigator: Gert Cauwenberghs

- Investigated the use of orthogonal codes for coded excitation in ultrasound signals to enable simultaneous transduction from multiple ultrasound transducers for fast, high-resolution imaging
- Assisted in development of system-level design for novel ultrasonic integrated circuits
- Simulated a sigma-delta ADC combined with IQ downconversion to take advantage of the narrow-band nature of ultrasound

University of California, Los Angeles

Undergraduate Researcher

Jun. 2017 - Jun. 2019

Principal Investigator: Wentai Liu

Phase Amplitude Coupling in Absence Seizure Patients

- Investigated existence of Phase Amplitude Coupling (PAC) in Electrocorticography (ECoG) signals recorded in absence seizure patients computationally by calculating a Modulation Index
- Implemented and tested traditional filter-based and Hilbert-Huang Transform based signal processing methods to further investigate physiological relevance of mathematical measures of coupling using MATLAB
- Used machine learning techniques to build a preliminary Random Forest model that used PAC values across different frequency bands to predict seizures in patients

Investigation of visual working memory function in the brain

- Analyzed EEG signals in patients performing visual working memory tasks in collaboration with a cognitive neuroscience laboratory
- Investigated the difference in EEG signals when patients memorized a word versus forgot a word using MATLAB for source localization, connectivity analysis, PAC analysis, and surrogate data analysis

UCLA Bioengineering Department

Bioengineering Capstone Design Project

Sep. 2018 - Mar. 2019

Principal Investigator: Tzung Hsiai

Electrical Impedance Tomography (EIT) for Nonalcoholic Fatty Liver Disease

- Worked in a team of six students to develop image classification, reconstruction, and segmentation algorithms with the Hsiai lab and Dr. Yuan Luo at the California Institute of Technology
- Developed a data collection tank for imaging of phantom models and livers

- Drafted NIH R21 style grant proposal and presented in a grant presentation style
- Managed logistics for effective teamwork and a \$1,000 research budget

Tohoku University

Apr. - Aug. 2018

International Undergraduate Researcher

Principal Investigator: Takashi Watanabe

Functional Electrical Stimulation Control of the Wrist

- Used LabVIEW to build a Fuzzy Logic control program for stimulation of the Extensor Carpi Radialis (ECR) muscle and compared to PID controller tuned by CHR method
- Communicated with lab members, presented in lab seminars in Japanese, and communicated with other program students in order to practice communication with international students and researchers
- Presented findings at international student research presentation seminar

PUBLICATIONS

- **Perley, A. S.** & Coleman, T. P. A Mutual Information Measure of Phase-Amplitude Coupling Using Gamma Generalized Linear Models. *Front. Comput. Neurosci.* 18, (2024).
- Liu, S., **Perley, A. S.** & Coleman, T. P. An Efficient Framework for Solving a Convex, State-Space Heartbeat Dynamics Model. in 2024 46th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) 21–24 (IEEE, Orlando, Florida, USA, 2024). *Accepted*
- **Perley, A. S.**, Subramanian, S. & Coleman, T. P. A Convex Formulation of Point Process Heartbeat Dynamics using a Gamma Generalized Linear Model. in 2023 IEEE 19th International Conference on Body Sensor Networks (BSN) 1–5 (IEEE, Boston, MA, USA, 2023). doi:10.1109/BSN58485.2023.10331291.
- Dershowitz, L. B., Garcia, H. B., **Perley, A. S.**, Coleman, T. P. & Kaltschmidt, J. A. Spontaneous enteric nervous system activity precedes maturation of gastrointestinal motility. *bioRxiv* 2023.08.03.551847 (2023) doi:10.1101/2023.08.03.551847.
- Monette, C. E., Seymour, A., Yu, W. T., Wan, L. T., **Perley, A. S.**, Venook, R. D. Board 16: Work in Progress: Designing a course to equip Bioengineering graduate students with effective and equitable teaching skills. in (2023).
- **Perley, A. S.** & Coleman, T. P. A Mutual Information Measure of Phase-Amplitude Coupling using High Dimensional Sparse Models. in 2022 44th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) 21–24 (IEEE, Glasgow, Scotland, United Kingdom, 2022). doi:10.1109/EMBC48229.2022.9871816.
- Balasubramani, P. P., Walke, A., Grennan, G., **Perley, A. S.**, Purpura, S., Ramanathan, D., Coleman, T. P., Mishra, J. Simultaneous Gut-Brain Electrophysiology Shows Cognition and Satiety Specific Coupling. *Sensors* 22, 9242 (2022).
- **Perley, A. S.**, Roustaei, M., Aguilar-Rivera, M., Kunkel, D., Hsiai, T., Coleman, T. P., Abiri, P. Miniaturized wireless gastric pacing via inductive power transfer with non-invasive monitoring using cutaneous Electrogastrography. *Bioelectron Med* 7, 12 (2021).

Academic Service

- IEEE Transactions on Biomedical Engineering. Impact Factor: 4.756 , Articles Reviewed: 1 (2022)
- IEEE Journal on Selected Areas in Information Theory. Impact Factor: 2.5, Articles Reviewed: 1 (2023)
- IEEE Engineering in Medicine and Biology Conference. Articles reviewed: 2 (2024)

PATENTS

- **Perley, A. S.**, Coleman, T. P., 2023, Systems and Methods for Assessing Hemodynamic Variability, Provisional Application No. 63/588,566, October, 6, 2023
- Abiri, P., **Perley, A. S.**, Hsiai, T., Coleman, T. P., 2022, Miniaturized Wireless Gastric Pacing with Non-Invasive Electrogastrographic Monitoring, Provisional Application Serial No. 63/371,227, August, 12, 2022

PRESENTATIONS

Oral Presentations

- 44th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC), Glasgow, Scotland, United Kingdom, July 2022. *A Mutual Information Measure of Phase-Amplitude Coupling using High Dimensional Sparse Models*

Poster Presentations

- 3rd Annual Stanford Data Science Conference, Stanford, California, USA, May 2024. *A Chow-Liu Approximation of Joint Circular Statistics for Electrophysiology*
- 2nd Annual NIH Investigator Meeting for Interoception Research, Bethesda, Maryland, USA, Nov. 2023. *A Convex Formulation of Point Process Heartbeat Dynamics for Autonomic Monitoring*
- 19th Annual IEEE International Conference on Body Sensor Networks, Cambridge, Massachusetts, USA, Oct. 2023. *A Convex Formulation of Point-Process Heartbeat Dynamics using Gamma Generalized Linear Models*
- 130th Annual American Society for Engineering Education Conference and Exposition, Baltimore, Maryland, USA, June 2023. *Work in Progress: Designing a course to equip Bioengineering graduate students with effective and equitable teaching skills*
- ISIT 2023 Workshop on Information-Theoretic Methods for Trustworthy Machine Learning, Berkeley, California, USA, May 2023. *A Fourier Basis Generalized Linear Model for Phase Amplitude Coupling*
- 2nd Annual Stanford Data Science Conference, Stanford, California, USA, May 2023. *A Fourier Basis Generalized Linear Model for Phase Amplitude Coupling*

TEACHING EXPERIENCE

Stanford University Department of Bioengineering

Bioengineering TA Program Co-Cordinator

Jun. 2022 - Present

- Leads and develops programming for to pair current teaching assistants (TAs) with TA mentors for support and implementing mid-quarter surveys to receive feedback on BioE courses and TA performance
- Runs a quarterly TA orientation for the Bioengineering department to help TAs understand skills necessary for instruction, how to handle unexpected situations, and course logistics
- Collaborates with student services to ensure that the TA program runs smoothly with the department, and intervenes when courses/TAs have TA related issues when necessary.

Instructor/Course Development - BioE 296

Jun. 2022 - Present

- Developed and co-instructed a course designed to teach graduate students about evidenced-based pedagogy, which culminated into a final project of the student's choosing.
- Published in the American Society for Engineering Education Conference on our work in equitable and effective education and communication
- Designing longitudinal studies to track the effectiveness of our course on improving both instructional and communication skills in participants

Teaching Assistant - BioE 230: Measurement, Probability, and Statistics

Apr. - Jun. 2023

- Taught graduate level probability and statistics in the lens of Bioengineering
- Gave a lecture on generalized linear models, point processes, and goodness-of-fit, and demonstrated to students how fundamental concepts can be used to generate novel research techniques and ideas with an example in my own work
- Held multiple office hour sessions a week, where I utilized pedagogical techniques to help students build mastery over material by developing their thought process and self-efficacy related to probability and statistics

UCSD Department of Bioengineering

Teaching Assistant - BENG 125: Nonlinear Dynamical Systems

Apr. - Jun. 2021

- Assisted in the instruction of 150 senior Bioengineering students in learning on nonlinear dynamical systems and chaos with applications in biology. Guided students through a term-long project that involved choosing a biological system of interest and modelling it with increasing complexity.

Teaching Assistant - BENG 189: Physiological Systems Engineering

Apr. - Jun. 2020

- Instructed students in Physiological Systems Engineering through leading discussion sections to teach principles of mathematical modelling of physiological systems, methods of implementation, and testing and experimental paradigms for extracting meaningful information from models

Teaching Assistant - BENG 152: Biosystems Engineering Laboratory

Jan. - Mar. 2020

- Instructed students in a biomedical instrumentation lab through hands-on teaching and instruction of principles of building physiological measurement devices such as ECG, EMG, and PPG devices

UCLA Center for Education Innovation and Learning in the Sciences

Learning Assistant, Physics

Jan. - Mar. 2018, Jan. - Jun. 2019

- Held weekly meetings with course professor to discuss worksheets and common misconceptions students have in Physics in order to improve teaching qualities
- Facilitated student engagement in peer learning in discussion sections, lecture, and review sessions
- Employed techniques from pedagogy seminar and feedback from students to improve teaching
- Taught both "Physics for Life Science Majors: Mechanics and Energy" and "Physics for Scientists and Engineers: Oscillations, Waves, Electric and Magnetic Field", which elucidated one aspect of diversity in student needs and educational backgrounds

UCLA Samueli School of Engineering

Mentor, Introduction to Engineering Design

JSep. 2016 - Jun. 2017

- Mentored freshman students taking Engineering Design course that used an Intel Edison micro-controller platform by helping with tutorials and guiding group project ideas
- Worked together with Professor, TAs, and other mentors to identify areas of improvement in the new program and help students gain critical design experience early in their college careers

EXTRACURRICULAR

Bioengineering Graduate Student Association

Stanford University

Community and Culture Co-Chair

Jan 2023 - Jan 2023

- Create community amongst the department, especially graduate students, by organizing events to allow students to foster bonds and creating mentorship opportunities

Bioengineering Graduate Society

University of California, San Diego

Mentorship Committee Member

Sep. 2020 - Jun. 2021

- Works one-on-one with new graduate students in the Bioengineering department to give advice on labs, research, and managing graduate school
- Helps with planning events for resources such as Mental Health panels and advice on navigating graduate school

Breakfast with Industry Committee Member

Sep. 2019 - Dec. 2020

- Assisted in the planning and logistics of an annual networking event for Bioengineering graduate students with representative industry members
- Working this year in structuring the event to be delivered effectively online for all 100 expected students, postdocs, industry, and faculty members involved

GradAMP Mentorship Program

University of California, San Diego

Mentor

Aug. 2020 - Apr. 2021

- Collaborates with graduate students at UCSD to provide free resources and mentorship to approximately 130 undergraduates across the whole UC system in an effort to provide equitable opportunity to especially underrepresented minorities across all fields of study
- Mentors undergraduate students looking to apply to graduate school one-on-one by giving concrete advice on the application process and feedback on essays

Biomedical Engineering Society

University of California, Los Angeles

General Member

Sep. 2015 - Jun. 2019

- Volunteered in events such as wheelchair building as a way of giving back to the community through fixing engineered health devices

Build Team Member

Sep. 2017 - Mar. 2018

- Collaborated in a student team in development of a knee brace equipped with motion sensors for Physical Therapists to track patient motion and recovery

Nikkei Student Union

University of California, Los Angeles

Co-Stage Manager

Jan. - Mar. 2017

- Worked with building staff and directors of Cultural Night to organize the lighting and cues for Japanese American cultural performance held in front of 1,000 people

Sound Manager

Jan. - Mar. 2016

- Communicated with director and performance groups to compile music and organize sound cues for Cultural Night held in front of over 1,000 people from the community

VOLUNTEER EXPERIENCE

Tohoku Tsunami Tree Planting

Apr. - Aug. 2018

Volunteer

- Participated in tree planting events at Millennium Hope Hills and Arahama city in Japan to support Tsunami Disaster prevention by creating a natural barriers to tsunamis

SKILLS

Programming Languages

C++, Python, MATLAB

Software & Tools

Bash, Git, GitlabCI/CD, Sherlock, Heroku, CVX/CVXPY, Statsmodels, Scikit-Learn, OpenCV

Visualization Packages

Bokeh, Plotly, Matplotlib

RELEVANT COURSES

Convex Optimization
Information Theory
Information Theory and Statistics
Theory of Statistics III
Fundamentals of Analysis
Digital Signal Processing
Research and Data Computation
Machine learning & data-driven modeling in bioengineering