

Jiaang Yao

Curriculum Vitae

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Education

- 2021 – 2026 **University of California, Berkeley/University of California, San Francisco**
San Francisco, CA Ph.D., Bioengineering
 Advisors: Philip A. Starr; Simon Little
- 2018 – 2021 **Columbia University**
New York, NY M.S., Electrical Engineering
 Thesis: Towards A Closed-Loop System for Epidural Electrical Stimulation
 Advisors: Jason B. Carmel; Paul Sajda
 Integrated EE BS/MS Program
- B.S., Electrical Engineering
 summa cum laude, Tau Beta Pi, Joint BA/BS 3-2 Program
- 2015 – 2020 **Wesleyan University**
Middletown, CT B.A., Biology, Mathematics, Neuroscience and Behavior
 Phi Beta Kappa, Joint BA/BS 3-2 Program

Research Interests

Parkinson's disease; deep brain stimulation (DBS); neuroengineering; movement disorder; machine learning theory; reinforcement learning; variational inference; optimization

Research Experience

- 2022 – Current **Graduate Student Researcher**, University of California, San Francisco
 Advisors: Philip A. Starr; Simon Little
- Developed the first long-term at-home adaptive deep brain stimulation (DBS) algorithm with higher symptom control than clinical stimulation
 - Redesigning biomarker selection pipeline for aDBS using nonlinear and deep learning models
 - Implementing automated parameter finetuning pipeline for aDBS using Bayesian optimization
- 2020 – 2021 **Research Assistant**, Columbia University Irving Medical Center
 Advisors: Jason B. Carmel
- Designed a decoder for predicting forelimb movement in rats using electrocorticography (ECoG) data.
 - Implemented MATLAB scripts for controlling behavioral task experiments and closed-loop stimulation sessions.

- Performed animal training and administered data recording sessions.
- Configured data collection pipeline and designed experiment protocols.

2018 – 2021

Research Assistant, Columbia University

Advisors: Paul Sajda

- Developed a state-space model algorithm for predicting the instantaneous phase of local field potential rhythms in real time.
- Devised multimodal neural network models that utilize features from volumes of optical coherence tomography angiography images for diagnosing neovascular age-related macular degeneration.
- Designed the first recurrent neural network model for ballistocardiogram (BCG) artifact suppression in simultaneous EEG-fMRI recordings that significantly outperformed the current state of the art.
- Implemented an open-source Python toolbox called BCGNet for users to train neural network models for suppressing BCG artifact.

2016 – 2018

Research Assistant, Wesleyan University

Advisors: Michael P. Weir

- Modeled interactions between 530-loop region of ribosome and mRNA during protein translation using support vector machines.
- Performed molecular dynamics analysis of ribosome during protein translation using AMBER.

Fellowships

2021 – 2023

Berkeley Fellowship for Graduate Study

Role: Graduate Fellow; Award amount: \$34000

Supported in part by the TUYF Charitable Trust Fund for Graduate Fellowships in Medical Science, Oceanography and Environmental Science

Summer 2019

Summer@SEAS at Columbia University

Role: Summer Fellow; Award amount: \$5000

Summer 2016

QAC Summer Apprentice at Wesleyan University

Role: Summer Fellow; Award amount: \$4000

Honors and Awards

2022

Erwin Howard Armstrong Memorial Award (MS), Columbia University

Awarded annually by the Faculty of Electrical Engineering to one outstanding candidate for the M.S. degree

2020

Erwin Howard Armstrong Memorial Award (BS), Columbia University

Awarded annually by the Faculty of Electrical Engineering to one outstanding candidate for the B.S. degree

2018 – 2020

Dean's List, All Available Semesters, Columbia University

Awarded in all semesters when mandatory Pass/Fail grading was not in place due to COVID19

- 2019 **Phi Beta Kappa Honor Society**, Fall Induction, Wesleyan University
Limited to 15 graduating seniors from the class of 2020
- 2019 **Tau Beta Pi Honor Society**, Spring Induction, Columbia University
Top 12% of the class of 2020 at Columbia Engineering
- 2015 – 2018 **Dean's List**, All Semesters, Wesleyan University
- 2017 **Plukas Teaching Apprentice Award**, Wesleyan University
Awarded to outstanding course assistants in the Economics department

Publications

* authors contributed equally

Peer-Reviewed Journal Articles

- J2.** K. A. Thakoor, **J. Yao**, D. Bordbar, O. Moussa, W. Lin, P. Sajda, and R. W. Chen, "A multimodal deep learning system to distinguish late stages of amd and to compare expert vs. ai ocular biomarkers," *Scientific Reports*, vol. 12, no. 1, pp. 1–11, 2022. DOI: 10.1038/s41598-022-06273-w
- J1.** J. R. McIntosh*, **J. Yao***, L. Hong, J. Faller, and P. Sajda, "Ballistocardiogram artifact reduction in simultaneous EEG-fMRI using deep learning," *IEEE Transactions on Biomedical Engineering*, vol. 68, no. 1, pp. 78–89, 2021. DOI: 10.1109/TBME.2020.3004548

Peer-Reviewed Conference Proceedings

- C1.** K. Thakoor, D. Bordbar, **J. Yao**, O. Moussa, R. Chen, and P. Sajda, "Hybrid 3D-2D deep learning for detection of neovascular age-related macular degeneration using optical coherence tomography b-scans and angiography volumes," *2021 IEEE 18th International Symposium on Biomedical Imaging (ISBI)*, pp. 1600–1604, 2021. DOI: 10.1109/ISBI48211.2021.9434111

Peer-Reviewed Conference Abstracts

- A1.** K. Thakoor, D. Bordbar, **J. Yao**, O. Moussa, W. Lin, I. Scherbakova, V. Diaconita, P. Sajda, and R. Chen, "A hybrid deep learning system to distinguish late stages of amd and to compare expert vs. machine amd risk features," *Investigative Ophthalmology & Visual Science*, vol. 62, no. 8, pp. 2146–2146, 2021

Presentations

* authors contributed equally

Conference Presentations

- CP2.** C. R. Oehr, S. Cernera, L. H. Hammer, M. Shcherbakova, **J. Yao**, A. G. Hahn, S. Little, and P. A. Starr, "Data-driven identification of a neural biomarker informs clinically effective adaptive deep brain stimulation in parkinson's disease," in *The 9th Annual BRAIN Initiative Meeting*, Bethesda, MD, Jun. 2023
- CP1.** S. Cernera, L. H. Hammer, C. R. Oehr, **J. Yao**, M. Shcherbakova, A. G. Hahn, S. S. Wang, C. A. Racine, J. A. Ostrem, C. N. Smyth, S. Little, and P. A. Starr, "At-home, embedded closed-loop deep brain stimulation using data-driven neural physiomarkers alleviates residual motor symptoms in parkinson's disease," in *The 10th International BCI Meeting: Balancing Innovation and Translation*, Brussels, Belgium, Jun. 2023

Poster Presentations

- PP5.** L. H. Hammer, C. Oehrn, S. R. Cenera, **J. Yao**, M. Shcherbakova, A. G. Hahn, S. S. Wang, C. A. Racine, J. A. Ostrem, C. N. Smyth, S. Little, and P. A. Starr, "Long term stability of subthalamic nucleus physiomarkers during optimization of an adaptive deep brain stimulation system," in *The 9th Annual BRAIN Initiative Meeting*, Bethesda, MD, Jun. 2023
- PP4.** L. H. Hammer, S. Cenera, C. R. Oehrn, **J. Yao**, M. Shcherbakova, A. G. Hahn, S. S. Wang, C. A. Racine, J. A. Ostrem, C. N. Smyth, S. Little, and P. A. Starr, "Patient-tailored closed-loop deep brain stimulation improves residual parkinson's disease symptoms during at-home evaluation," in *The 11th International IEEE/EMBS Conference on Neural Engineering (NER)*, Baltimore, MD, Apr. 2023
- PP3.** K. Thakoor, D. Bordbar, **J. Yao**, O. Moussa, W. Lin, I. Scherbakova, V. Diaconita, R. Chen, and P. Sajda, "A hybrid deep learning system to distinguish late stages of AMD and to compare expert vs. machine AMD risk features," in *2021 Annual Meeting of Association for Research in Vision and Ophthalmology (ARVO)*, May 2021
- PP2.** **J. Yao***, Y. Lin*, J. R. McIntosh, L. Hong, J. Faller, and P. Sajda, "BCGNet: A deep learning toolbox for ballistocardiogram artifact suppression in EEG-fMRI recordings," in *2020 IEEE Brain Workshop on Advanced Neurotechnologies*, Oct. 2020
- PP1.** **J. Yao**, J. W. Glickman, D. Krizanc, and M. P. Weir, "Refining a model for rRNA base pairing to mRNA during protein translation," in *17th Annual Biophysics Retreat of Wesleyan University*, Middletown, CT, Sep. 2016

Teaching Experience

Spring 2021	Course Assistant , Columbia University ECBM E4040: Neural Networks and Deep Learning
Fall 2020	Course Assistant , Columbia University ECBM E4040: Neural Networks and Deep Learning
Spring 2020	Lab Assistant , Columbia University ELEN E3082: Digital Electronics Laboratory
Fall 2018	Teaching Assistant , Wesleyan University BIOL 181: Principles of Biology I: Cell Biology and Molecular Basis of Heredity
Fall 2016	Course Assistant , Wesleyan University ECON 110: Introduction to Economic Theory

Professional Service

Journal Reviewer (ad hoc)

Neural Plasticity, Neurolmage: Clinical, npj Parkinson's Disease

Professional Membership

International Parkinson and Movement Disorder Society (MDS)
Institute of Electrical and Electronics Engineers (IEEE)
American Society of Biochemistry and Molecular Biology (ASBMB)

Technical Skills

Programming: Python, MATLAB, CUDA, Java, Unity, C

Language: Mandarin (Native), Japanese (Intermediate), Italian (Elementary)