MARGOT WAGNER[mwagner@ucsd.edu](mailto:mwagner@ucsd.edu) | 630.808.6840 | [in/margot-wagner](https://www.linkedin.com/in/margot-wagner/) | [margotwagner.com](https://www.margotwagner.com/)

**EDUCATION**

**University of California, San Diego**  Expected: May 2023   
*Ph.D. in Bioengineering*  *La Jolla, CA*

* Thesis Advisors: Terrence J. Sejnowski, Gert Cauwenberghs
* Working Thesis Title: “Human and Artificial Intelligence: Bidirectional Inspiration Provides Insights”
* Relevant Coursework Deep Learning, Principles of AI, Web Mining & Recommender Systems
* Awarded: **NSF Graduate Research Fellowship Program Award** (2018 – 2023)

**University of Delaware** 2014 – 2018

*B.Ch.E in Chemical and Biomolecular Engineering (Honors with Distinction) Newark, DE*

* Exchange program in Chemical Engineering at National University of Singapore, 1 of 2 selected students
* Awards: **Telkes Distinguished Scholar Award** (4-year full tuition scholarship

**RESEARCH AND PROFESSIONAL EXPERIENCE**

**Graduate Student Researcher** June 2019 – Present

*The Computational Neurobiology Lab and Integrated Systems Neuroengineering Lab, UCSD La Jolla, CA*

* Building forward probabilistic graphical model for fMRI data representation using a 11,500 subject **longitudinal** dataset
* Discovering **main predictors** of mental illness using machine/deep learning in the **large-scale multimodal** and longitudinal [ABCD dataset](https://en.wikipedia.org/wiki/ABCD_Study) utilizing behavioral, demographic, clinical measurement, imaging, and biological data
* Working to create a next generation **biologically inspired AI** neural network with biophysically meaningful parameters tunable for specific learning tasks utilizing **probabilistic graphical models**
* Built a biophysically realistic stochastic 3D reaction-diffusion model for synaptic transmission using MCell software and Python scripts containing 120 molecular states
* Developed equivalent stochastic **Markov chain** synapse abstraction in Python with biologically tunable parameters, decreasing runtime by 93% and FLOPs by an order of magnitude for use in artificial neural networks models
* Optimized parameters to match biological conditions using **parameter sweep** techniques by running models on **supercomputer** clusters and analyzed subsequent large-scale datasets

**AI NLP Research Scientist Intern,** *OPTT Health*  July 2022 – Present

* Built data preprocessing, augmentation, and **classification** pipeline for psychotherapy text data

**Google Computer Science Research Program Mentee,** *Google*Feb 2021 – June 2021

* Collaborated with a Google researcher to design a research project utilizing large-scale psychiatric healthcare data

**Consulting Analyst,** *Mindful Care* Feb 2021 – May 2021

* Worked collaboratively with a team of 6 analysts to explore market fit for Mindful Care’s talk therapy AI technology

**Simula Computational Physiology Summer School** June 2019, Aug 2019

*Simula Research Laboratory, University of Oslo and UCSD Oslo, Norway and La Jolla, CA*

* Selected as one of twenty researchers to attend and participate in this fully funded summer school
* Collaborated with a team of international researchers on a project modeling Hodgkin-Huxley type neurons

**Graduate Research Rotations,** *UCSD*Sept 2018 – June 2019

* Developed patient-specific MATLAB **machine learning** models to classify **attention states** using **EEG** data for 27 patients achieving 70% accuracy for use in ADHD diagnostics
* Classified oddball responses in Parkinson’s patients using **nonlinear dynamical system embeddings**
* Designed and ran pilot study with a single participant for an EEG reading comprehension experiment and created data analysis pipeline including **ICA** to locate biomarkers for use in classroom applications

**SELECT PROJECTS**

* Wrote the **backend** and basic features for an application tracking and monitoring medication usage in polypharmacy patients including reminders and warnings for potential drug interactions (MedHacks Hackathon, 2nd place)
* Implemented **NLP** sentence generator for 3 conditions and classified generated sentences using BERT classifier
* Analyzed 7k gene RNA-seq dataset from Allen Brain Atlas using **ICA, PCA, clustering,** and **classification** to predict brain regions (98.7% accuracy for 3 regions, 67.1% accuracy for 10 regions)
* Predicted collision severity (66.25% acc) using 5.78 GB traffic records with ~100 features from 2001-2020

**LEADERSHIP AND MENTORING EXPERIENCE**

**Research Project Manager,** *UCSD*  Aug 2022 – Present

* **Recruited and mentored** 6 undergraduate researchers on machine learning projects related to the ABCD dataset
* Create and maintain workspaces and workflows for project-related tasks

**Co-Director and Co-Founder of** [**Science in Society Seminar Series**](https://inc.ucsd.edu/events/collaboratory/)Sept 2019 – June 2020

*The Collaboratory, Institute of Neural Computation, UCSD*

* Organized with Roger Bingham, hosting expert speakers to discuss topics, such as loneliness, with the general public, obtaining attendance of >200 people. Ran student roundtable discussions. Analyzed feedback to optimize attendance.

**High School Outreach Co-Chair and Student Mentor** Sept 2019 – Mar 2020

*Bioengineering Graduate Society, UCSD*

* Created and ran curriculum for 30 high school students, with topics such as EEG/ECG collection and data analysis.
* Mentored 4 first-year graduate students with monthly one-on-one meetings

**Teaching Assistant**, *UCSD*  Jan 2019 – Mar 2020

* Ran a lab and discussion section with 30 undergraduate students (BENG 1) and 50 graduate students (BENG 260) various modules including 3D printing, wearable sensors, biomechanics, and neurodynamics programming

**Student Research Mentor** June 2018

*Science Department, Maine South High School Park Ridge, IL*

* Helped 12 high school students design and execute their own 4-week projects and experiments to compete at the Illinois Junior Academy of Science and the Intel Science Fair in May 2019.

**SELECT PUBLICATIONS AND PRESENTATIONS**

**Publications**

* **M Wagner**, T Bartol, T Sejnowski, G Cauwenberghs, “Markov Abstractions of Electrochemical Reaction-Diffusion in Synaptic Transmission for Neuromorphic Computing,” *Front Neurosci,* in review.
* J Forder, M Smith, **M Wagner**, R Schaefer, J Gorky, K van Golen, A Nohe, and P Dhurjati, “A Physiologically-Based Pharmacokinetic Model for Targeting Calcitriol-Conjugated Quantum Dots to Inflammatory Breast Cancer Cells,” *Clin Transl Sci,* 12: 617-624, July 2019.

**Poster Presentations**

* **M Wagner**, T Bartol, T Sejnowski, G Cauwenberghs, “Towards Biophysically-Based Neuromorphic Computing at Scale: Markov Abstractions of Electrochemical Reaction-Diffusion in Synaptic Transmission.” *IBM IEEE AI Compute Symposium* Oct. 2020.

**SKILLS**

**Programming Languages** Python · Java · C++ · MATLAB · SQL · Bash

**Software Tools** Git · Linux/Unix · PyTorch · HuggingFace · Weights & Biases · MLFlow