CHING FANG

ching.fang@columbia.edu | chingf.github.io

EDUCATION

Columbia University Aug 2019-present
PhD candidate in Neurobiology & Behavior
Advisors: Larry Abbott, Dmitriy Aronov

University of California, Berkeley December 2018
B.A. in Computer Science, B.A. in Molecular & Cell Biology (Honors)

AWARDS

2019 National Science Foundation Graduate Research Fellow

2018 IL Chaikoff Award for excellence in U.C. Berkeley's neuroscience program

2018 Best presentation award at Molecular & Cell Biology undergraduate symposium

2018 Dean's Honors List in recognition of academic performance

PUBLICATIONS & CONFERENCE POSTERS

Tyulmankov, D.*, **Fang, C.***, Vadaparty, A., and Yang, G.R. Biological key-value memory networks. (*NeurIPS 2021*; * equal contribution).

Vendrell-Llopis, N., **Fang, C.**, Qu, A., Costa, R., Carmena, J. Diverse operant control of different motor cortex populations. (under revision at *Current Biology*)

Vendrell-Llopis, N., **Fang, C.**, Qu, A., Kitano, M., Costa, R., Carmena, J. Isolating cell-type specific subpopulations of motor cortex neurons during neuroprosthetic learning. 48th Meeting of the Society for Neuroscience (SfN), 2019.

Fang, C., Laboy-Juarez, K., Feldman, D. Neural Coding of Whisker Timing in Multi-Whisker Sensation. California Cognitive Science Conference, 2018

RESEARCH EXPERIENCE

Abbott/Aronov Lab | Columbia Theoretical Neuro. Center Aug 2019 - present

- Designing recurrent neural networks (RNNs) to compute reinforcement learning (RL) representations as a model of long-term memory formation and retrieval.
- Analyzing and modeling neural data from the hippocampus of food-caching birds.

Yang Lab | MIT Brain & Cognitive Sciences Jan 2021 - present

- Developing neurally-plausible learning rules to implement the key-value storage and attention mechanisms used in transformer neural networks.
- Comparing representations of transformer neural networks and models of long-term memory in hippocampus.

Paninski Lab | Columbia Theoretical Neuro. Center Aug 2019 - Dec 2019

· Rotation project adapting probabilistic graphical models to find latent states of behavior and decision making in mice.

Carmena Lab | Berkeley EECS Department May 2018 - Aug 2019

· Ran brain-machine interfaces (BMI) experiments and analyzed data to investigate neuroprosthetic learning in motor cortex.
· Interpreted machine learning models by using Shapley values to understand how intrinsic properties of neurons affected how well these neurons could be used in BMI control.

Feldman Lab | Helen Wills Neuroscience Institute Jan 2015 - May 2018

· Developed computational models of neurons in somatosensory cortex as a population of negative binomial processes modulated by sensory input timing.

Collins Lab | Berkeley Cognitive Science Department June 2016 - Aug 2016

· Developed a behavioral application to test RL models of human decision making.

TEACHING

Lecturer, *Math Tools for Neuroscience* at Columbia University Jan 2022 - present

· Taught linear algebra for a course on fundamental math topics for PhD students in neuroscience.

TA, *Synthetic Biology* at UC Berkeley Aug 2018 - Dec 2018

· Helped manage a hybrid online/in-person class between UC Berkeley & MIT and led discussion sections
· Topics: metabolic engineering, genome engineering, protein and RNA circuits, gene drives

TA, *Algorithms & Intractable Problems* at UC Berkeley Aug 2017 - Dec 2017

· Developed new course project for 700+ students on approximate solutions to NP-hard problems.
· Led discussion sessions for 60+ students.
· Topics: asymptotics, graph theory, linear and dynamic programming, approximation algorithms

TA, *Data Structures* at UC Berkeley Aug 2016 - Aug 2017

· Developed course materials and tests, helped manage 300+ student course, and ran discussion sessions.
· Topics: Java programming, data search structures, graph algorithms, etc.

MENTORING & OUTREACH

Columbia Access Neuroscience Aug 2020 - present

· Helped organize diversity initiatives for underrepresented minorities on the undergraduate level

Zuckerman Institute Gender Inclusion (ZIGI) Group June 2021 - present

· Helped organize a seminar series on topics related to gender inclusivity in science

Leadership Alliance Summer Research Mentor June 2021 - Aug 2021

Columbia Neuroscience Outreach *Scientist on the Subway* Writer Aug 2020 - Dec 2020

SKILLS

Languages: Python, Java, Matlab
Miscellaneous: Pytorch, Linux, Git, Arduino, Slurm, Jupyter, Matplotlib