# JIARUI (RAY) FANG

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## EDUCATION

**Bachelor of Science, Cornell University**, 2020.8 - Expected 2024.5
Double Majors: Biological Sciences \Biometry & Statistics
Minor: Computer Science
GPA: **4.2/4.3**
Dean's List all(6) consecutive semesters
**Relevant courses**: Intro to Behavior, Intro to Neuroscience, Intro Computational Neuroscience, Genetics and Genomics, Computer Vision, Intro to Machine Learning, Biological Statistics, Neural Representations, Statistical Computing, Methods in Neuroscience, Linear Models with Matrices

## RESEARCH EXPERIENCE

**Undergraduate Research Assistant** 2023.6 - 2023.8
Churchland Lab with Prof. Anne Churchland *UCLA*

- Selected as a scholar by the prestigious UCLA Neuroscience Scholars program.
- Collected the neural spike of the medial prefrontal cortex region during multisensory decision-making tasks of rats.
- Applied advanced tools and techniques, including machine learning algorithms, to analyze Ephys data and videos. Identified sub-trial level posture dynamics in the decision-making task.

**Undergraduate Research Assistant** 2022.9 - present
Computational Physiology Lab with Prof. Thomas Cleland *Cornell University*

- Utilized transfer learning techniques to enhance the functionality of the open-source computer vision package, Annolid, enabling the detection of digging behavior in mice. Developed a computationally efficient method for complex behavioral analysis. This approach has achieved an AUC of 0.98 on the ROC curve, demonstrating high model performance. An abstract of this work, "Scoring rodent digging behavior with Annolid," has been accepted for presentation at Neuroscience 2023, hosted by SfN.
- Optimize and enhance the few-shot learning neural network in the olfactory system.

**Undergraduate Research Assistant** 2021.9 - present
The Laboratory of Neurobiology of Learning and Memory with Prof. David Smith *Cornell University*

- Conducted a conditional discrimination task requiring rats to respond variably to odors depending on their context, enabling the study of context-dependent memory. This methodology provides insights into the linkage between memory and the environment in which it is learned.
- Utilized electrodes to record electrical signals from neurons in the Anterior Olfactory Nucleus (AON), investigating their role in odor discrimination. Preliminary analyses have revealed context-specific activity in certain neurons, illuminating potential avenues for further research.

**High School Research Assistant** 2016.11 - 2019.6
with Prof. Zhong, Yi *Tsinghua University*

- Maintained Drosophila strains with various mutations and implemented Pavlovian olfactory conditioning procedures to evaluate their learning abilities.
- Utilized trans-TANGO technique for downstream neuron staining, contributing to how mushroom body output neurons connect to downstream neurons.
- Engineered a Python-based program to automate fly counting, effectively replacing manual counting and significantly reducing researcher effort and time.

## ACADEMIC EXPERIENCE

- **Course Staff**, CS 4780 Intro to Machine Learning 2023.8-2023.12
  Will be responsible for refreshing projects, managing grading sessions, holding office hours, and aiding in other administrative tasks.
- **Course Staff**, CS 2110 Object-Oriented Programming and Data Structures 2022.8-2022.12
  Graded assignments and exams, held office hours, and answered questions on EdDiscussion for this Java course.
- **Biological Sciences Summer Internship Program,** Office of Undergraduate Biology, Cornell 2022.6-2022.8
  Assisted Prof. David Smith in his research.

## SKILLS

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|---|---|
| **Coding** | Python (intermediate machine learning), Java, LaTeX, R, MATLAB |
| **Web Dev** | HTML, CSS, JavaScript |
| **Bio Tech** | Behavior training in rats and flies, PCR, Gel electrophorescence, Nissl staining, Immunofluorescence microscopy |
| **Languages** | Strong English and Mandarin Chinese |

## CONFERENCE

- **Neuroscience 2023**. Society for Neuroscience(SfN)
  Primary author: "Scoring rodent digging behavior with Annolid"
  Co-author: "Neuronal Responses in the Anterior Olfactory Nucleus During a Complex Odor Memory Task"

## EXTRA-CURRICULAR ACTIVITIES

- **President**. In Transcription, Cornell Branch 2023 - present
  Organize and host lectures by inviting esteemed professors specializing in biology to share their research insights. Facilitate fundraising activities by engaging with sponsors and leading members in creating and selling items. Coordinate and conduct various biology-related activities to foster a vibrant learning community.
- **Volunteer**. American Red Cross 2022 - present
  Actively participate in organizing and managing blood donation events. Assist in donor registration and post-donation care to ensure a smooth and safe experience for donors.