JIZHENG DONG

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EDUCATION

Tandon School of Engineering, New York University Sep 2023 - Dec 2025
MS in Computer Science GPA 3.87/4.00

Department of Mathematics, Nanjing University Sep 2016 - Jun 2020
BS in Information and Computational Science (Applied Mathematics) GPA 4.23/5.00

RESEARCH INTERESTS

Connectome Modeling, Brain Dynamics and Simulation, Behavioral Data Analysis

PUBLICATION AND PRESENTATION

WormID-Benchmark: Extracting Whole-Brain Neural Dynamics of C. elegans At the Neuron Resolution Jan 2025
*Jason Adhinarta, **Jizheng Dong**, Tianxiao He, Junxiang Huang, Daniel Sprague, Jia Wan, Hyun Jee Lee, Zikai Yu, Hang Lu, Eviatar Yemini, Saul Kato, Erdem Varol, Donglai Wei*

bioRxiv

Poster: Genetic decoding of neuron wiring in visual system of Drosophila Oct 2024
***Jizheng Dong**, Alexander Ratzan, Himanshu Gupta, Sahil Faizal, Richard Mann, Erdem Varol*

Neuroscience 2024, Society for Neuroscience

Poster: Structured feature detection during social interactions Jul 2023
*J Ning, X Zhang, **J Dong**, Z Li, Y Shao, J Wang, D Chen, Q Liu, Y Sun*

The 16th Annual Meeting of Chinese Neuroscience Society

Poster: Quantification of natural social interactions Jul 2023
*J Ning, X Zhang, **J Dong**, Z Li, J Wang, D Chen, Q Liu, Y Shao, Y Sun*

The 16th Annual Meeting of Chinese Neuroscience Society

Poster: Gesture analysis during social interactions in Drosophila Oct 2021
*J Ning, **J Dong**, X Zhang, Z Li, J Wang, D Chen, Q Liu, Y Sun*

CSHL Neurobiology of Drosophila

PATENTS

3D Pose Detection Method, System, Device and Storage Medium for Dynamic Interactive Objects 2025
*Yi Sun, **Jizheng Dong**, Jing Ning, Xinjiang Zhang*

Patent ID: 202410176441.0 Chinese National Intellectual Property Administration (CNIPA)

3D Dynamic Model Reconstruction Method, System, Device and Storage Medium for Objects 2025
*Yi Sun, Jing Ning, **Jizheng Dong**, Xinjiang Zhang*

Patent ID: 202410176440.6 Chinese National Intellectual Property Administration (CNIPA)

Real-time Motion Monitoring and Control System, Device and Method for Moving Objects 2024
Yi Sun, Xinjiang Zhang, ***Jizheng Dong****, Jing Ning*

Patent ID: 202410176439.3 Chinese National Intellectual Property Administration (CNIPA)

RESEARCH EXPERIENCE

Institute of Brain and Cognitive Science, NYU Shanghai Jul 2025 – Present
Research Intern, supervised by Dr. Zhuo-Cheng Xiao *Shanghai, China*

Project: Biologically Realistic Modeling of the Drosophila Motion Detection Pathway

- Implemented conductance-based models for medulla interneurons and T4/T5 neurons to reproduce direction-selective responses to edge motion stimuli in Drosophila.
- Developed both single-compartment point neuron models and multi-compartment Hodgkin–Huxley models to simulate the full motion detection circuit from photoreceptors to T4/T5 neurons.
- Incorporated biologically detailed neuron morphology, neurotransmitter–receptor specificity to constrain and optimize model parameters.

Tandon School of Engineering, New York University Jan 2025 - Dec 2025
Project Lead *New York City, NY, US*

Project: ConVis - Interactive Large-scale Neuron Network Visualization

- Led overall system design and architecture for a Web-based 3D visualization tool supporting 140,000 neurons with semantic zooming and hierarchical exploration.
- Designed the core framework integrating Three.js/WebGL rendering, data preprocessing pipelines, and interactive UI components for multi-scale neuron exploration.
- Implemented simplification algorithms to reduce neuron complexity while preserving morphological features, enabling efficient rendering of dense neural networks.
- Architected data loading algorithms with buffer mechanisms and chunked loading strategies to handle large-scale SWC neuron files while maintaining real-time performance.
- Coordinated a 5-person team across frontend development, visualization algorithms, and data processing; managed GitHub repository and project documentation.

Neuroinformatics lab, New York University Sep 2023 - Jun 2025
Graduate student researcher, supervised by Dr. Erdem Varol *New York City, NY, US*

Project: Genetic Decoding of the Brain Connectome

- Integrating single-cell resolution electron microscopy (EM) connectomics data with single-cell genomics to uncover the relationship between gene expression and neuronal circuit connectivity.
- Investigating genes and proteins influencing neuron morphology (e.g., dendritic pruning) and synapse formation using traditional machine learning techniques, such as bilinear models and Support Vector Machine (SVM), as well as advanced graph-based models, including Graph Attention Network (GAT) and Graph Auto-Encoder (GAE).
- Applying graph mining and rule learning techniques (SCC-based module discovery, DNF rule extraction) to uncover interpretable gene combinations that explain synaptic connectivity patterns from connectomics and transcriptomics data.
- Utilizing AlphaFold3 to predict and analyze interactions between Cell Adhesion Molecules (CAMs) identified through computational models, providing novel insights into their roles in synapse formation and neuronal connectivity.
- Presented posters at Neuroscience 2024, Society for Neuroscience (Oct 2024).

Project: Neural Activity Simulation Based on Whole-Brain Connectome

- Building a synapse-level spiking neural network to predict large-scale neural activity, integrating connectome data and in vivo calcium imaging.
- Simplifying neuron morphologies using key structural points, constructing adjacency matrices for connections between simplified neurons, implementing time-sensitive Leaky Integrate-and-Fire models for enhanced accuracy.

Project: WormID-Benchmark: Whole-Brain Neural Dynamics Extraction in C. elegans

- Led the development and evaluation of 3D Neuron Detection Task in NeuroPAL volumes, implementing and benchmarking mask-based (CellPose) detection methods across 104 worms from 5 laboratories.
- Designed and implemented 3D Neuron Identification Task for 302-way neuron classification, evaluating alignment-based (CPD, Statistical Atlas) and classification-based (fDNC, CRF ID) approaches with 5-fold cross-validation on 94 worms.
- Established standardized evaluation metrics including F1-score, precision, recall for detection, and top-1/top-5 accuracy for identification, with distance thresholds accounting for anisotropic resolution across diverse imaging setups.
- Integrated foundational models into an end-to-end pipeline, combining detection, identification, and tracking modules to extract complete neural activity traces from multi-modal microscopy data.
- Preprints at bioRxiv (Jan 2025).

Lab of Systems Neuroscience &Neuroengineering, Westlake University Oct 2020 - Jul 2023
Research Assistant, supervised by Dr. Yi Sun *Hangzhou, China*

Project: 3D Behavior Recording

- Real-time key points detection of fruit fly, computational reconstruction 3D posture based on prediction result of 2D key points from multi-view cameras.
- Training convolutional neural network to predict 3D posture based on monocular top-view image for multiple animals.

Project: Visual-motor transformation during Drosophila courtship

- Extracted key kinematic features from high-resolution motion data and performed dimensionality reduction for downstream analysis.
- Performed unsupervised behavior classification using k-means and visualized behavioral structure via UMAP embeddings.
- Quantified male–female interaction patterns across different behavioral contexts.
- Analyzed multi-body-part motion coordination underlying core behaviors such as forward walking, crab walking, and wing extension.
- Characterized behavioral state transitions and identified movement patterns associated with phase changes during courtship.
- Presented research findings in posters at the 16th Annual Meeting of the Chinese Neuroscience Society.
- Filed three patents with the China National Intellectual Property Administration (CNIPA).

Institute of Nanshu, Nanjing University Aug 2020 - Sep 2020
Research Intern, supervised by Dr. Ting Wu *Nanjing, China*

Project: Steel Defect Detection

- Defect detection of industrial steel products using segmentation model of convolutional neural network (CNN).

Department of Computer Science, Nanjing University Dec 2019 - May 2020
Research Intern, supervised by Dr. Yang Gao *Nanjing, China*

Project: Defense of Adversarial Attacks

· Modification of neural network structure to defend adversarial attacks based on the theory and method of filter and edge detection.
· Design of a Hebbian rule inspired recurrent module for the network and resulting discovery of the similarity between attacked images and the module modified images, which may be the attention of neural network during classification.

Institute of Brain and Cognitive Science, NYU Shanghai Jul 2019 - Aug 2019
Research Intern, supervised by Dr. Sukbin Lim *Shanghai, China*

Project: Inferring Synaptic Plasticity Rule

· Developed a computational method based on gradient descent to use macaque brain neural activity data to infer synaptic plasticity rule under the assumption of random connection in recurrent neural network.
· Provided feasible explanations for the information storage mechanism in the neural network upon receiving orthogonal distributed stimuli.

Institutes of Brain Science, Fudan University Jul 2018 - Aug 2018
Research Intern, supervised by Dr. Jiayi Zhang *Shanghai, China*

Project: Imitation Behavior of Rodents

· Construction of experimental equipment using Raspberry Pi, cameras, and mechanical sensors for mice behavior recording.
· Correlation analysis between the chewing behavior and vision of mice under peer influence.
· Image processing algorithm for the dyed neurons counting.

HONORS AND AWARDS

NYU Violet Internship & Research Award
NYU School of Engineering Fellowship
The National Basic Subject Top-notch Talent Scholarship
The People's Scholarship in China

SKILLS AND HOBBIES

Programming	Python, MATLAB, R, C++
CS	Image Processing, SQL, LaTeX, Deep Learning (PyTorch, TensorFlow)
Leadership	Vice-Chairman of NJU Leadership Club, Originator of *Flint* Interdisciplinary Colloquium
Sports	Archery, Marathon