Yanxin Xie

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EDUCATION

Xi'an Jiaotong University (C9 League, Project 985) Sep. 2022-June 2026

Bachelor of Automation, Faculty of Electronic and Information Engineering **Cumulative GPA:** 93.1/100

- **Core courses:** Cybernetics (100/100); Circuit Theory (100/100); Operations Research I (99/100); Probability Theory and Stochastic Processes (99/100); Analog Electronics (98/100); Linear Algebra and Geometry (97/100); Digital Image and Video Processing (97/100); University Physics (97/100)

RESEARCH INTERESTS

I am interested in how neural circuit dynamics support the formation, consolidation, and generalization of memory, particularly during sleep. Using biologically constrained models, I aim to investigate these dynamical mechanisms and explore their implications for brain-inspired computation.

RESEARCH EXPERIENCES

1. PKU, Guozhang Chen's Team at Peking University, School of Computer Science Beijing, China

RA in Computational Neuroscience Remote, Jan. 2026-June 2026 | In-person, Jul. 2026-Present

Project: Hippocampal Circuit Modeling and Behavioral Generalization

Research question: How do hippocampal circuit dynamics support memory formation and fear-memory generalization across contexts?

Contributions:

- Built a biologically grounded bilateral CA1–CA3 spiking network comprising nearly 60,000 neurons and 30 million synapses across 14 pathways.
- Independently derived a Bayesian connectivity framework using conditional relative-entropy reconstruction; integrated three complementary databases to estimate connection probabilities conditioned on neuronal type and spatial position, addressing the lack of a comprehensive hippocampal connectome.
- Identified missing inhibitory inputs caused by independent Bernoulli connectivity sampling in a sparsely inhibitory network; introduced a coverage correction to ensure inhibitory input to sampled neurons.
- Calibrated E/I dynamics using Optuna optimization to establish a stable baseline before task experiments.

Current focus: Designing a four-stage fear-memory generalization paradigm that combines attractor formation, BTSP-mediated hetero-association, EC3/SOM-modulated plateau gating, and offline reactivation.

Outcomes: Established memory attractors exhibiting pattern completion; manuscript in preparation.

2. XJTU, Department of Automation Xi'an, China Dec. 2025-June 2026

Undergraduate Thesis: Multi-omics Regulatory Network Inference for Alzheimer's Disease

Research question: How can distal, nonlinear gene regulatory pathways in Alzheimer's disease be inferred beyond linear, proximal associations?

Contributions:

- Integrated paired hippocampal snATAC-seq and snRNA-seq data from 50,381 cells to construct an explicit TF→Peak→Gene regulatory graph, using JASPAR/FIMO motif scanning and distance-based genomic priors.
- Designed a two-stage, eight-head graph attention network (GAT) with a differentiable ATAC-prediction gate and multitask loss to model nonlinear regulatory interactions along these pathways.
- Evaluated predictive performance and regulatory interpretability through baseline comparisons, ablations, perturbations, and GO enrichment.

Outcomes: Achieved $R^2 = 0.9904$ for gene expression prediction; completed the project as my undergraduate thesis with a thesis defense score of **97/100**.

3. HKU, Caro Lai's Team, Li Ka Shing Faculty of Medicine Hong Kong, China

Research Intern in Neurobiology Remote, April 2025-Nov. 2025

Project: Automated detection pipeline for dendritic spines

Research question: How can bouton and spine formation and elimination be quantified from longitudinal *in vivo* two-photon imaging to characterize synaptic structural plasticity during memory formation?

Contributions:

- Processed large-scale *in vivo* two-photon imaging datasets in ImageJ.
- Manually tracked perisomatic boutons and dendritic spines and quantified their formation and elimination.

- Developed an automated 4D analysis pipeline to support manual annotation, combining Cascade R-CNN-based 2D object detection, 3D volumetric reconstruction, and longitudinal tracking across imaging sessions.

Outcome: Delivered the algorithm to laboratory members for routine image annotation and analysis.

4. XJTU, Interdisciplinary Research Team of Automation/AI and Bioinformatics Xi'an, China
Research Intern in AI & Bioinformatics Jul. 2023-Sep. 2024

Research Projects:

KGRACDA (Graph ML for Bioinformatics)
Research question: How can knowledge-graph methods predict circRNA–disease associations?
Contributions:
- Contributed to knowledge-graph research for circRNA–disease association prediction.
- Contributed to manuscript preparation.

Outcome — Publication: Ying Wang, Maoyuan Ma, **Yanxin Xie**, et al. "KGRACDA: A Model Based on Knowledge Graph from Recursion and Attention Aggregation for CircRNA-Disease Association Prediction." *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 21(6), 2133–2144, 2024

findGSEP (Computational Genomics)
Research question: How can the genome size of polyploid species be estimated using k-mer frequencies?
Contributions:
- Conducted data-processing experiments and simulations in Python/R for polyploid genome size estimation.
- Contributed to the manuscript and created figures in Adobe Illustrator.

Outcome — Publication: Laiyi Fu, **Yanxin Xie**, et al. "findGSEP: Estimating Genome Size of Polyploid Species Using k-mer Frequencies." *Bioinformatics*, 40(11), btae647, 2024.

PROFESSIONAL EXPERIENCE

Changhong Hongwei Technology Co., Ltd. Chengdu, China
Software Development Intern July. 2025-Sep. 2025

Project: "Changhong Agent" Shopping Guide Robot
- Developed a ROS 2 communication interface for a SLAM-based shopping-guide robot, supporting integration between the navigation and application components.
- Authored comprehensive API documentation to support interface integration, handoff, and maintenance.

HONORS & PRIZES

Outstanding Graduate, Xi'an Jiaotong University 2026
National Scholarship (Top 3%), Ministry of Education of China 2025
President's Scholarship (Ranked 1st in Major; Top 10 University-wide) 2024
Second Prize, "Chufeng Cup" Museum Interpretation Competition in Shaanxi Province 2024
Outstanding Student, Xi'an Jiaotong University 2023, 2024, 2025

ESSENTIAL SKILLS

- **Programming:** Python (Frameworks: PyTorch, TensorFlow, scikit-learn), C, MATLAB, R, LaTeX
- **Tools:** VS Code, Linux, Visio, Adobe Illustrator, Zotero, Overleaf, Altium Designer, Keil
- **Machine Learning & Computational Modeling:** classical machine learning (SVM, k-NN, XGBoost, naïve Bayes); deep learning (CNN, GNN, Transformers, VAEs); spiking neural networks

CAMPUS EXPERIENCES

President, Student Culture and Museum Society, XJTU September 2023 – June 2025
- Led 11 large-scale cultural programs, including a "Museum Night" attended by 300+ visitors; achieved coverage from 20+ mainstream media outlets and 400,000+ total views.
- Created experiential cultural programs and strengthened volunteer training; contributed three articles to *China Youth Daily*. Led the team to earn the "Five-Star club" award.

LANGUAGES AND INTERESTS

Languages: Native in Chinese and Fluent in English (TOEFL iBT: 101).
Interests: Pilates (Certified Instructor), Volunteering (300+ hours), Museums and Traditional Culture