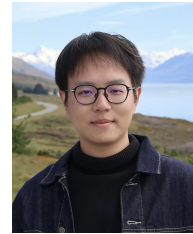


Hongwei Yan

Brain-inspired AI | AI for Science

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anapplecore.github.io | GitHub | Google Scholar | LinkedIn



Research Overview

- **Brain-inspired AI.** Learning and memory mechanisms for foundation models and agents, with a focus on long-term memory, knowledge accumulation, generalization, and self-improvement through experience.
- **AI for Science.** Foundation models from neural and biological data, and AI tools for scientific research and analysis. My work spans neuroscience and computational biology, from multimodal neural representations to transcriptomics.

Education

- **Tsinghua University** Sep 2022 – Present
Ph.D. student in Biology, School of Life Sciences
Advisors: Prof. Yi Zhong and Prof. Kaisheng Ma
- **Tsinghua University** Sep 2018 – Jun 2022
B.Eng. in Computer Science, **Yao's Class**
Institute for Interdisciplinary Information Sciences (IIIS)

Research Experience

- **Beijing Academy of Artificial Intelligence (BAAI)** Sep 2024 – Present
AI Research Intern | Dr. Bo Lei
Contribute to the pretraining, evaluation, and downstream applications of **Brain μ** , a multimodal foundation model for neuroscience. Explore unified representations of neural signals, language, and vision to connect neural activity with perceptual and semantic information.
- **Tsinghua University — Research Collaboration** Jun 2023 – Present
Collaborator: Prof. Liyuan Wang, currently in the Department of Psychological and Cognitive Sciences
Develop brain-inspired algorithms for knowledge retention, efficient adaptation of pretrained models, and generalization. Investigate modular expert routing and learning mechanisms inspired by biological memory, with work spanning continual learning, domain generalization, and knowledge distillation.
- **Computational Biology — Undergraduate Research** Apr 2020 – Aug 2021
With Prof. Jianyang Zeng (Tsinghua IIIS) and Prof. Sheng Wang (University of Washington)
Developed deep learning methods for single-cell transcriptomics and developmental trajectory prediction, as well as drug–target interaction prediction. Explored the integration of spatial transcriptomics with gene ontology to connect gene expression with biological function.

Honors and Awards

- **National Scholarship for Graduate Students (twice)** 2024, 2026
- Tsinghua Xuetang Talent Development Scholarship, First Prize 2019–2022
- Baidu Star Scholarship, Second Prize 2020
- Outstanding Student Social Work Cadre 2019

Academic Service

- **Reviewer:** ICLR, ICML, CVPR, ECCV, IEEE TIP, Neural Networks.
- **Teaching Assistant, Tsinghua:** Brain-Inspired Artificial Intelligence, Research Practice, Research Immersion Training, and Diploma Project (Thesis).

Publications

[†] Equal contribution. 8 published papers; 2 manuscripts under review.

First and Co-first Author Papers

4 papers

1. CE⁴L: Continual Ego, Exo, and Ego-Exo Learning

Hongwei Yan, Kanglei Zhou, Yuchen Liu, Qingyu Shi, Yi Zhong, Liyuan Wang.

ICML 2026 [Paper](#) / [Code](#)

Introduces a continual ego–exo video benchmark and VISTA, a lightweight adapter method with training-free subspace routing for joint task and viewpoint shifts.

2. FlyPrompt: Brain-Inspired Random-Expanded Routing with Temporal-Ensemble Experts for General Continual Learning

Hongwei Yan, Guanglong Sun, Kanglei Zhou, Qian Li, Liyuan Wang, Yi Zhong.

ICLR 2026 [Paper](#) / [Code](#)

Combines a random-expanded analytic router with temporal-ensemble experts to adapt pretrained models to single-pass data streams without clear task boundaries.

3. Right Time to Learn: Promoting Generalization via Bio-inspired Spacing Effect in Knowledge Distillation

Guanglong Sun[†], Hongwei Yan[†], Liyuan Wang, Qian Li, Bo Lei, Yi Zhong.

ICML 2025 [Paper](#) / [Code](#)

Introduces a temporal gap between teacher and student updates in knowledge distillation, linking generalization gains to flatter loss landscapes.

4. Orchestrate Latent Expertise: Advancing Online Continual Learning with Multi-Level Supervision and Reverse Self-Distillation

Hongwei Yan, Liyuan Wang, Kaisheng Ma, Yi Zhong.

CVPR 2024 [Paper](#) / [Code](#)

Coordinates experts at different network depths through multi-level supervision and reverse self-distillation to balance new-data learning and replay-based retention.

Selected Collaborative Papers

4 papers

5. MePo: Meta Post-Refinement for Rehearsal-Free General Continual Learning

Guanglong Sun, Hongwei Yan, Liyuan Wang, Zhiqi Kang, Shuang Cui, Hang Su, Jun Zhu, Yi Zhong.

ICML 2026 [Paper](#) / [Code](#)

6. Spacing Effect Improves Generalization in Biological and Artificial Systems

Guanglong Sun[†], Ning Huang[†], Hongwei Yan, Jun Zhou, Qian Li, Bo Lei, Yi Zhong, Liyuan Wang.

Patterns 2026 (Cover Article) [Paper](#)

7. ComMem: Complementary Memory Systems for Test-Time Adaptation of Vision-Language Models

Guanglong Sun[†], Shuang Cui[†], Bo Lei[†], Liyuan Wang, Zihan Zhai, Hongwei Yan, Hang Su, Jun Zhu, Yi Zhong.

CoLLAs 2026 [Paper](#)

8. MindPainter: Efficient Brain-Conditioned Painting of Natural Images via Cross-Modal Self-Supervised Learning

Muzhou Yu[†], Shuyun Lin[†], Hongwei Yan, Kaisheng Ma.

AAAI 2025 (Oral) [Paper](#)

Uses cross-modal self-supervision and a brain adapter to condition image inpainting and outpainting on visual brain signals.

Manuscripts under Review

2 manuscripts

9. Brain-Inspired Hierarchical Modularity for General Continual Learning

Hongwei Yan[†], Kanglei Zhou[†], Qi Cheng, Weiyi Dong, Chunyan Lan, Guanglong Sun, Jun Zhou, Qian Li, Yi Zhong, Liyuan Wang.

Under review at Nature Machine Intelligence [Preprint](#)

Combines modular expert routing with spatial and temporal integration for continual adaptation across visual, multimodal, and embodied tasks.

10. Domain Generalizable Continual Learning

Hongwei Yan, Guanglong Sun, Zhiqi Kang, Yi Zhong, Liyuan Wang.

Under review at International Journal of Computer Vision [Preprint](#) / [Code](#)

Separates semantic and domain information for continual task learning and generalization to unseen task–domain combinations.