
Jia-Hao (Jay) Ji

M.D. Candidate | AI Researcher | Physician-Scientist in Training

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Eight-year M.D. candidate at Shanghai Medical College, Fudan University developing reliable agentic and multimodal AI systems for biomedical discovery. My research connects large-language-model agents, spatial omics, digital pathology, and neuroscience, with emphasis on measurable reliability and scalable scientific workflows.

Agentic AI for Science

Spatial Omics

Multimodal Learning

Multi-Agent Reasoning

Neuroscience

Selected Publications and Manuscripts

Candidate supply and answer selection shape the value of LLM judging in multi-agent systems

Jia-Hao Ji, Sijie Li, Jiabei Cheng, Zixi She, Jin-Tai Yu, and Zhiyuan Yuan. arXiv:2608.25937 [cs.AI, cs.MA], 2026. [Paper](#)

- Separated candidate generation, answer recognition, and terminal selection in controlled multi-agent reasoning experiments across five benchmarks.
- Analysed 15,336 questions and replayed 81,390 fixed candidate pools; changing only the final selection rule increased accuracy from 63.82% to 70.82–70.95%.

SpatialDataAgent: Autonomous Spatial Omics Data Curation at Decade Scale

Jia-Hao Ji, Qi Zou, Jiabei Cheng, Zixi She, Yining Hao, Weishi Liu, Daoliang Zhang, Zhikang Wang, Jin-Tai Yu, and Zhiyuan Yuan. bioRxiv, 2026. [DOI](#)

- Conceived and led development of an evidence-grounded agentic workflow combining schema-constrained evaluation with self-refining data standardisation.
- Recovered 769 paired H&E–spatial transcriptomics datasets, expanded existing curated baselines by 6.4-fold, and assembled HESRT with 29.2 million spots or cells.

Spatiotemporally resolved transcriptome unveils reactive subpallial microglia underlying cholinergic vulnerability in Alzheimer's disease

Jia-Hao Ji (co-first author) et al. Under review at *Cell*, 2026.

- Integrated spatial transcriptomics, single-nucleus sequencing, and in situ amyloid pathology across 12.36 million spatial profiles.
- Characterised disease-associated microglial microenvironments and their relationship to basal forebrain cholinergic vulnerability.

Research Experience

Researcher and Project Lead

Sep 2023 – Present

[Fudan Data-Driven Future Lab & Institute of Medical Genetics, Fudan University](#)

Advisors: Prof. Jin-Tai Yu and Prof. Zhiyuan Yuan | Alzheimer's disease, spatial omics, and biomedical AI

- Lead computational projects spanning large-scale spatial-data curation, multimodal tissue registration, and disease-focused analysis of histology and molecular profiles.
- Developed transformer-based and image-registration pipelines to align whole-slide pathology with spatial transcriptomic coordinates and map beta-amyloid plaque microenvironments.
- Designed reproducible agentic workflows with explicit schemas, evidence tracking, failure auditing, and multi-stage validation.

Undergraduate Researcher

Oct 2021
– Jun 2023

[Prof. Bin Song's Lab, Fudan University](#)

Parkinson's disease and single-cell transcriptomics

- Built scRNA-seq analysis pipelines to identify markers relevant to the purity, safety, and therapeutic potential of autologous iPSC-derived dopaminergic progenitor transplantation.

Undergraduate Researcher

Sep 2019 – Jul 2021

[Prof. Fei Lan's Lab, Institutes of Biomedical Sciences, Fudan University](#)

DNA methylation, epigenetics, and molecular biology

- Received wet-lab training in cell culture, molecular assays, and experimental analysis of DNA methylation and epigenetic regulation.

Education and Clinical Training

Doctor of Medicine, Eight-Year Clinical Medicine Program	Sep 2019 – Jun 2027 (expected)
Shanghai Medical College, Fudan University	
Clinical focus in neurology; research focus in biomedical AI, computational biology, spatial omics, and neurodegenerative disease.	
Exchange Program	Sep 2021 – Feb 2022
University of California, Los Angeles	
Interdisciplinary coursework and research-oriented academic training.	
Clinical Elective, Department of Medicine	Apr 2025 – May 2025
HKU Queen Mary Hospital	
Ward rounds, case discussions, and multidisciplinary clinical teaching.	

Selected Systems and Engineering

ASSA – Autonomous Self-Sovereign Agent	2026
Independent open-source project	
Developed an agent framework with hierarchical memory, reflection, and skill-generation mechanisms for long-horizon adaptation. GitHub	
Spatial-CLIP	2025 – Present
Multimodal representation learning for spatial biology	
Fine-tuned vision-language encoders with contrastive objectives to align histopathology images and spatial transcriptomic states for cross-modal retrieval and analysis. GitHub	

Teaching and Scientific Communication

- Delivered invited sessions for graduate and undergraduate students on practical AI workflows for literature synthesis, scientific writing, and reproducible research, Fudan University, December 2025.
- Developed a course module on artificial intelligence in scientific discovery and biomedical research; maintain a technical research blog at [jiahaoblog.com](#).

Technical Expertise

Machine Learning	PyTorch, transformers, graph neural networks, contrastive learning, multimodal foundation models, LLM agents, judge-based evaluation, multi-agent systems
Biomedical Data	Spatial transcriptomics, single-cell RNA-seq, digital pathology, whole-slide imaging, tissue registration, statistical analysis
Engineering	Python, R, TypeScript, Linux, Git, multi-GPU training, high-performance computing, Lang-Graph, ReAct-style orchestration

Honours and Languages

Selected Honour	First Prize, National Biology Olympiad (China); ranked 9th in Guangdong Province
Languages	Mandarin, Cantonese, and Teochew (native); English (TOEFL 105); Spanish (basic)