

Sixian SHEN

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RESEARCH INTERESTS

- | | | |
|-----------------------------------|-------------------------|--------------------------------|
| • AI4Science | Protein Language Models | Cryo-EM |
| • Computer Vision | 3D Vision | Scene Generation |
| • Generative Models Theory | Diffusion Models | Probabilistic Graphical Models |

EDUCATION

B.Sc, Computer Science

GPA: [3.xx/4.0](#)

2024-present

ShanghaiTech University

EXPERIENCE

Research Intern

[StepFun, Co., Ltd.](#)

Jun. 2025 to Sep. 2025

Research Intern

[VRVC Lab](#), supervised by [Prof. Jingyi Yu](#)

Sep. 2025 to present

PROJECTS

- **ProtLingo: Towards Efficient Protein Language Models.** Jun. 2026 to Present
Conducted a comprehensive analysis and systematic improvement upon cutting-edge models (ESMs). Co-led the development of **ProtLingo**, an efficient protein language modeling framework for sequence modeling. Key contributions include the design of a centered latent N -gram memory module for reusable local-context retrieval, the integration of sparse Mixture-of-Experts upcycling for residue-dependent computation, and the establishment of a parameter-efficient continuation-training pipeline based on pretrained ESM2 backbones. Conducted comprehensive experiments across protein fitness prediction, FLIP benchmarks, supervised contact prediction, and biological specialization analyses, demonstrating that ProtLingo achieves competitive performance with a compact active-parameter budget while preserving structure-relevant representations, [under review](#). Ongoing efforts focus on training ProtLingo from scratch at larger scale, aiming to democratize efficient protein language modeling for downstream biological tasks while improving representation quality, scaling behavior, and task generalization.
- **CryoACE & CryoAtlas: Towards Cryo-EM Foundation Models** Sep. 2025 to Feb. 2026
Cryo-electron microscopy (cryo-EM), recognized by the [2017 Nobel Prize in Chemistry](#), has become a central technology for resolving protein structures from experimental density maps. Built a large-scale cryo-EM dataset by curating over 20,000 paired density maps and atomic structures from [National Facility for Protein Science](#) in Shanghai, [Protein Data Bank \(PDB\)](#) and [Electron Microscopy Data Bank \(EMDB\)](#). Designed and implemented preprocessing pipelines for sequence-structure alignment, structure-density registration, Q-score computation, map denoising, and benchmark construction, resulting in one of the largest cryo-EM datasets and evaluation suites to date. Contributed to training and improving ModelAngelo on this dataset, achieving enhanced automated model-building performance; this work is currently [under review](#). Contributed to developing **CryoACE**, a neural pipeline for automated atomic model building from Cryo-EM maps by integrating structural priors from AlphaFold3 with heterogeneity modeling from Cryo-EM foundation models. CryoACE resolves continuous conformational states directly from experimental density, enabling dynamic mechanistic interpretation beyond static structures, and was accepted to [ICML 2026](#).
- **SPREAD: Development for Plausible 3D Scene Generation Methods** Aug. 2025 to Mar. 2026
Contributed to [SPREAD](#), a diffusion-based 3D scene generation framework that jointly models spatial relations, physical interactions, and geometry-aware object layouts for embodied AI environments. Responsible for the **multi-guidance framework**, implementing differentiable collision, gravity, and relation guidance to reduce interpenetration, floating artifacts, and relational inconsistency during sampling. Led systematic evaluation on 3D-FRONT and ProcTHOR, covering FID, mesh collision rate, graph recall, average support distance, and NVIDIA Isaac Sim stability. Also participated in dataset preprocessing and relation annotation, including scene decomposition, object filtering, mesh correction, grounding, and support/spatial-relation extraction. The method was accepted to [CVPR 2026](#).

PUBLICATIONS

- 1. ProtLingo: Efficient Protein Language Modeling via Conditional Memory and Expert Routing.
Mingrui Li*, **Sixian Shen***, Minzhang Li, Ruiyi Zhang, Kexin Zhang, Jiakai Zhang, Jingyi Yu.
[[Arxiv](#), [Tentative, 2026](#) | [Code](#) | [Paper](#)]
- 2. SPREAD: Spatial-Physical REasoning via geometry Aware Diffusion.
Minzhang Li*, Kuixiang Shao*, Xuebing Li, Yuyang Jiao, YINUO Bai, Hengan Zhou, **Sixian Shen**, Jiayuan Gu, Jingyi Yu.
[[CVPR, 2026](#) | [Code](#) | [Paper](#)]
- 3. CryoACE: An Atom-centric Framework for Accurate and Automated Model Building in Cryo-EM .
Minzhang Li, Mingrui Li, Weichen Qin, Qihe Chen, **Sixian Shen**, Yuan Pei, Jiakai Zhang, and Jingyi Yu.
[[ICML, 2026](#) | [Code](#) | [Paper](#)]
- 4. CryoAtlas: An Atom-centric Framework for Accurate and Automated Model Building in Cryo-EM .
Mingrui Li, Minzhang Li, Weichen Qin, Yufan Xie, Zhangzhi Xiong, **Sixian Shen**, Jiakai Zhang, Yuan Pei, Jingyi Yu
[[Arxiv](#), [Tentative, 2026](#) | [Dataset](#) | [Code](#) | [Paper](#)]
- 5. Evolution-Aware MSA Reasoning for Subsampling via Factor Graphs.
Zhangzhi Xiong*, Minzhang Li*, Haotian Yu*, **Sixian Shen**, Kexin Zhang, Mingrui Li, Jie Zheng, Kewei Tu, Jingyi Yu
[[Arxiv](#), [Tentative, 2026](#) | [Code](#) | [Paper](#)]

AWARDS

zhe li xie shu xue jian mo	2025
first place, qi ta de jiang xiang	xxxx
you are the best :)	xxx

REFERENCES

Prof. Jingyi Yu	Supervisor, IEEE Fellow	SHANGHAI TECH UNIVERSITY	yujingyi@shanghaitech.edu.cn
Minzhang Li	Student Mentor, Ph.D.	SHANGHAI TECH UNIVERSITY	limzh2022@shanghaitech.edu.cn