# Jiakai Zhang

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## Research Interests

- **Protein-centric AI** Cryo-EM Reconstruction Long Sequence Modeling Protein Design
- **Computer Vision** Dynamic Reconstruction Neural Human Novel View Synthesis

## Education

**Ph.D Degree, Computer Science** 2020-2025(Expected)
GPA: 4.0/4.0, published 9 papers in NC, NeurIPS, CVPR, and SIGGRAPH. ShanghaiTech Univeristy
**B.Sc, Computer Science** 2016-2020
ShanghaiTech University

## Experience

**CEO, Co-founder** Cellverse, Co., Ltd. Feb. 2023 to Present
**Conference/Journal Reviewer** NeurIPS, ICLR, CVPR, SIGGRAPH... Jun. 2021 to Present
**Research Scientist Intern** Surreal, Meta Reality Labs Aug. 2022 to Jan. 2023

## Projects

- **Neural Pipeline for Cryo-EM.** Feb. 2023 to Present
  Developed the first cryo-EM image foundation model via our novel denoising-reconstruction auto-encoder (DRACO) and the first generative cryo-EM (CryoGEM) for high-quality annotated data generation, NeurIPS'24 for both. Before that, we developed the first transformer-based model, CryoFormer to automatically recover and highlight the protein heterogeneity, accepted by theECCV'24 NFBCC Workshop with a spotlight award. Currently, I am focusing on the end-to-end protein reconstruction with unposed cryo-EM images (ab-initio reconstruction).

- **Single-pixel Spectrometers via Neural Spectral Fields** Mar. 2023 to Jan. 2024
  To reconstruct the optical spectrum for our novel single-pixel-photodetector spectrometer, we proposed a tailored method called Neural Spectral Fields (NSF) that leverages the unique wavelength and bias-dependent responsivity matrix. Published on Nature Communications.

- **Dynamic Scene Reconstruction via Neural Radiance Fields** Sep. 2020 to Aug. 2022
  Presented the first editable free-viewpoint video based on spatial-temporal neural radiance field, ST-NeRF, accepted by SIGGRAPH'21. Proposed Fourier Plenoctrees (FPO) for real-time rendering of dynamic NeRF, accepted by CVPR'22, oral presentation.

- **Neural Human Modeling & Rendering.** Aug. 2017 to Aug. 2018
  Proposed the generalized neural human NeRF that combines dynamic NeRF with the skinned multi-person linear model (SMPL) representation taking only six sparse views as inputs, accepted by CVPR'22. Furthermore, to unlock the streaming capability of dynamic human NeRF, we proposed neural animated mesh (NAM), accepted by SIGGRAPH Asia'22.

- **CASP and AI Protein Platform.** Feb. 2023 to Present
  Participated in the 16th Critical Assessment of Techniques for Protein Structure Prediction (CASP 16). Led a small engineering team to develop an AI protein platform that can online predict, evaluate, and further design the protein structures by various pre-trained models including AF2, RFDiffusion, LigandMPNN, and our latest ShanghaiTech Fold (our re-implemented version of AF3). **Now the service is widely used in our campus.**

- **Co-founded Cellverse.** Aug. 2022 to Present
  Motivated by the enterprising spirit of ShanghaiTech, I co-founded Cellverse with my advisor Prof. Jingyi Yu, and my lab mates. We aim to build cutting-edge AI solutions for the most crucial yet challenging tasks in the microscopic world, especially for protein discovery, prediction, and generation (design). As CEO, I led the company from its inception, achieving key milestones such as securing angel funding and initiating collaborative projects. This unique journey has equipped me with strong leadership, strategic planning, and technical collaboration skills.

## Publications

1. Cryo-GEM: Physics-Informed Generative Cryo-Electron Microscopy.
**Jiakai Zhang***, Qihe Chen*, Yan Zeng, Wenyuan Gao, Xuming He, Zhijie Liu, and Jingyi Yu.
[NeurIPS'24 | Project | Code | Paper]

2. DRACO: A Denoising-Reconstruction Autoencoder for Cryo-EM.
Yingjun Shen*, Haizhao Dai*, Qihe Chen, Yan Zeng, **Jiakai Zhang**, Yuan Pei, and Jingyi Yu
[NeurIPS'24 | Project | Code | Paper | HuggingFace Demo]

3. Single-pixel P-graded-n Junction Spectrometers.
Jingyi Wang, Beibei Pan, Zi Wang, **Jiakai Zhang**, Zhiqi Zhou, Lu Yao, Yanan Wu, Wuwei Ren, Jianyu Wang, Haiming Ji, Jingyi Yu, Baile Chen
[Nature Communications, 2024 | Paper ]

4. CryoFormer: Continuous Reconstruction of 3D Structures from Cryo-EM Data using Transformer-based Neural Representations.
Xinhang Liu, Yan Zeng, Yifan Qin, Hao Li, **Jiakai Zhang**, Lan Xu, Jingyi Yu.
[ECCV'24 Workshop on NFBCC, Spotlight | Project | Paper]

5. NeuVV: Neural Volumetric Videos with Immersive Rendering and Editing.
**Jiakai Zhang**, Liao Wang, Xinhang Liu, Fuqiang Zhao, Minzhang Li, Haizhao Dai, Boyuan Zhang, Wei Yang, Lan Xu, Jingyi Yu.
[Arxiv, 2022 | Paper]

6. Human Performance Modeling and Rendering via Neural Animated Mesh.
Fuqiang Zhao, Yuheng Jiang, Kaixin Yao, **Jiakai Zhang**, Liao Wang, Haizhao Dai, Yuhui Zhong, Yingliang Zhang, Minye Wu, Lan Xu, Jingyi Yu
[SIGGRAPH Asia'22 | Project | Code | Paper]

7. Fourier Plenoctrees for Dynamic Radiance Field Rendering in Real-time.
Liao Wang*, **Jiakai Zhang***, Xinhang Liu, Fuqiang Zhao, Yanshun Zhang, Yingliang Zhang, Minye Wu, Jingyi Yu, and Lan Xu.
[CVPR'22, Oral | Project | Paper]

8. HumanNeRF: Efficiently Generated Human Radiance Field from Sparse Inputs
Fuqiang Zhao, Wei Yang, **Jiakai Zhang**, Pei Lin, Yingliang Zhang, Jingyi Yu, Lan Xu.
[CVPR'22 | Project | Code | Paper ]

9. Editable Free-Viewpoint Video using a Layered Neural Representation.
**Jiakai Zhang**, Xinhang Liu, Xinyi Ye, Fuqiang Zhao, Yanshun Zhang, Minye Wu, Yingliang Zhang, Lan Xu, Jingyi Yu
[SIGGRAPH'21 | Project | Code | Paper | Two-minute Papers ]

10. LGNN: A Context-aware Line Segment Detector.
Quan Meng, **Jiakai Zhang**, Qiang Hu, Xuming He, Jingyi Yu.
[ACM MM'20 | Paper ]

## Awards

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| NeurIPS Top Reviewer | 2024 |
| National Scholarship | 2022 |
| First Place in ShanghaiTech 2nd Innovation and Entrepreneurship Summit | 2020 |
| Excellence Scholarship of ShanghaiTech University | 2017 |

## References

Prof. Jingyi Yu  Supervisor, IEEE Fellow  ShanghaiTech University  yujingyi@shanghaitech.edu.cn