

Zhenyan Xing

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Summary

Undergraduate researcher specializing in AI-driven de novo protein design. Proficient in developing high-throughput generative pipelines and structure-based evaluation metrics. Aiming to advance multimodal biomolecular design and therapeutic discovery in a rigorous computational biology Ph.D. program.

Education

Xi'an Jiaotong University, BS in Electrical Engineering

Sept 2023 – July 2027

- Undergraduate cumulative GPA: 3.58/4.3

Hong Kong Polytechnic University, Exchange Student

Sept 2025 – Dec 2025

- cumulative GPA: 3.5/4.3

Research Experience

HomoPrefix: Homolog-Conditioned Protein Sequence Generation

Jun 2026 – Present

Tsinghua University, Supervisor: *Prof. Ziqi Gao*

Shenzhen, China

- Developed HOMOPrefix, a homolog-conditioned protein sequence generation framework that conditions autoregressive protein suffix generation on family-level tags and homolog-derived continuous prefix embeddings
- Designed a PoET-to-ProGen2 Draft interface by projecting homolog-context embeddings into ProGen2 hidden space and concatenating [family tag] + [homo prefix] + [protein tokens] through `inputs_embeds` with suffix-only label supervision
- Built an end-to-end first-stage generation pipeline spanning Draft training/evaluation, sequence rollout, homolog-context refresh, correction-tuple construction, and a speculative-decoding-inspired Target/Modify control flow, with integration adapters and dependency diagnostics for PoET/ProGen2

RNA Binder Hallucination Design for Protein–RNA Complexes

Dec 2025 – Present

Chinese University of Hong Kong, Supervisor: *Prof. Yu Li*

Hong Kong

- Developed a Protenix-based hallucination pipeline for RNA binder design, optimizing RNA sequence logits against a frozen pretrained protein–RNA complex predictor while keeping the protein target fixed.
- Advanced the workflow from contact-driven search to staged soft, straight-through, hard-discrete, and greedy optimization, improving the transition from differentiable RNA distributions to discrete candidate sequences.
- Designed RNA-specific objectives and controls for target-epitope localization, secondary-structure/scaffold preservation, base/sugar/2'-OH interface chemistry, phosphate-dominance reduction, confidence-aware pLDDT/PAE/distogram scoring, and clash/off-target-contact suppression.
- Built closed-loop validation and selection tooling with full-sequence feature rebuilds, fixed-protein-frame geometry analysis, native contact/scaffold calibration, multistart and ablation experiments, gate audits, decoy checks, free-state RNA foldability checks, and candidate-bank reranking.

HelixLinkerLab: AI-Assisted Automatic Design for Protein Fusion Linker

Feb 2026 – Apr 2026

University of Virginia, Supervisor: *Prof. Jie Yang*

Charlottesville, VA

- Developed a Python research software pipeline to generalize MBP–DELE1 linker design into structure-aware MBP–linker–target fusion construct generation from protein sequence or structure inputs
- Built an auditable CLI workflow for target precheck, N-terminal helix/boundary analysis, linker-bank sampling, prediction job preparation, output parsing, candidate scoring, and ranked report generation
- Integrated AI-based protein modeling/design tools, including Protenix, ColabFold/AlphaFold2, AlphaFold3-style input preparation, and ProteinMPNN-based local redesign of linker/interface residues
- Implemented interpretable prediction-derived ranking metrics using PAE, junction pLDDT, CA-based helix continuity, steric clash checks, and multi-seed orientation consistency, exporting results as CSV, JSON, FASTA, and offline HTML reports

De novo Helical Linker Design for MBP–DELE1 Fusion Proteins

Nov 2025 – Feb 2026

University of Virginia, Supervisor: *Prof. Jie Yang*

Charlottesville, VA

- Designed rigid helical linkers to connect MBP with DELE1 CTD, optimizing for continuous α -helix formation to improve fusion geometry and stability for downstream structural and biochemical characterization
- Implemented RFdiffusion + ProteinMPNN + AlphaFold3 pipeline to generate, redesign, and validate constructs; selected top-5 candidates via helix-continuity and predicted-confidence screening
- Performed residue-level interface analysis (salt bridges/H-bonds/hydrophobic packing) and proposed targeted point-mutation strategies to resolve polarity/steric mismatches and improve complex stability

InflamRisk: Intelligent Inflammation Assessment System for Primary Prevention of Cardiovascular Disease

Jun 2025 – Jun 2026
Xi'an, China

Xi'an Jiaotong University, Supervisor: *Prof. Xiaolian Shi*
Registered Software Copyright (China): *InflamRisk Mini Program (V1.0)*, Nov 2025

- Developed InflamRisk, a WeChat mini program that integrates blood-count, dietary, and lifestyle inputs into an inflammation-oriented cardiovascular risk self-assessment workflow for primary prevention
- Implemented rule-based assessment engines for SII, DII, and LIS, including real-time input validation, on-device score computation, risk stratification, interpretable result summaries, and personalized diet/lifestyle recommendations
- Built registration-ready software features in WXML/WXSS/JavaScript, including multi-page assessment flows, custom navigation components, result visualization, Canvas-based image export, album authorization handling, and privacy-minimizing local computation

RFdiffusion-based *de novo* Closed Repeat Protein Design

Jun 2025 – Aug 2025
Shenzhen, China

Southern University of Science and Technology, Supervisor: *Prof. Zhe Li*

- Designed novel closed repeat proteins using RFdiffusion by developing a new workflow to create stable, closed-loop structures, generated 80224 candidate structures and screened 29601 stable structures
- Workflow: Generate and connect symmetric protein structures with RFdiffusion, generate multiple sequences with ProteinMPNN, and screen proteins with SuperFold (rmsd<2&pddt>90)

Honors & Awards

- H Prize, The Mathematical Contest in Modeling (2025)
- University First-Class Scholarship (2025)
- Ruwen Wang Electrical Scholarship (2024)
- Provincial First Prize, China International College Students' Innovation Competition (2025)
- Third Prize, National English Competition for College Students (2024)

Activities

- Captain, Campus Ambassador Team**

Oct 2023 – Jun 2024
- Admission Office, Xi'an Jiaotong University
- Sole recipient from Chongqing for *Outstanding Individual* in Admissions Promotion
- Head, Youth League Organization and Guidance Center**

Oct 2023 – Jul 2025
- The Youth League Committee of Xi'an Jiaotong University
- Accredited as excellent student leader of the department

Skills

Protein Tools: RFdiffusion, ProteinMPNN, AlphaFold 3, SuperFold, PyMol
Technical: Python, C++ , MATLAB, Linux, PyTorch, TensorFlow, CAD, Multisim, COMSOL
Languages: Chinese; English (Proficient) : TOEFL 96/120; Duolingo 125/150; CET-6 541/710