ZIYAN HUANG

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EDUCATION

South China University of Technology (SCUT), Guangzhou, China

Bachelor of Data Science and Big Data Technology, Junior Undergraduate   ***Average Score:*** *87.52*   **09/2022 – 06/2026**

Main Courses: *Advanced Language Programming (4.0/4.0), Advanced Language Programming Training (4.0/4.0), Data Structure Course Training (4.0/4.0), Introduction to Big Data (4.0/4.0), Linear Algebra and Analytic Geometry (4.0/4.0), Discrete Mathematics (4.0/4.0), Artificial Intelligence and 3D Vision (4.0/4.0).*

The Hong Kong University Science and Technology (HKUST), Hong Kong, China

Exchange student in Department of Computer Science & Engineering   **09/2024 – 01/2025**

Complementary learning

(Coursera) Hebrew University of Jerusalem, Synapses, Neurons and Brains, course grade:99.87

EXPERIENCE

Neuro-Inspired Mechanisms for Robust Encoding and Memory Control

- **Modeling Robust Neural Encoding at the Single-Neuron Scale**

  Research Intern, SCUT School of Future Technology, supervised by Prof. Bin Hu   ***Mar. 2023 – Apr. 2024***
  Investigated how biologically inspired single-neuron models enhance the stability and fidelity of auditory representations under noise and clinical variability, grounded in computational neuroscience principles. **One paper submitted (final decision pending).**

  - **(TCDS Co-First author) (IF=5) RBA-FE: A Robust Brain-Inspired Audio Feature Extractor for Depression Diagnosis**
    Designed a leaky integrate-and-fire neuron model with adaptive thresholds to preserve temporal precision under noise and depression-domain shifts, forming the core of the RBA-FE feature extractor.

- **Decoding Network-Level Neural Representations for Cognitive Signals**

  Research Intern, CAS Institute of Neuroscience, supervised by Prof. Tielin Zhang   ***Mar. 2025 – Present***
  Extended spiking neuron principles to recurrent network dynamics, aiming to uncover how circuit structures enable adaptive long-term memory control. Developed computational frameworks linking Poisson-gated firing patterns to stable information routing, and applied motif-based analyses to identify structural units that support efficient, interpretable reasoning. These insights inform the design of brain-inspired AI architectures with controllable long-term memory behavior. **One paper in preparation.**

Designing Cognitive Control Mechanisms for Reliable Multimodal Reasoning   ***Jan. 2025 – Present***
Leveraged cognitive control theories to engineer interpretable decision-making frameworks for multimodal large language models, enabling adaptive reasoning strategies, reliable factual grounding, and consistent knowledge management in long-horizon, multi-turn tasks. **One paper accepted, two paper submitted (denoted with *).**

- **(EMNLP 2025 Co-First author) ReLoop: "Seeing Twice and Thinking Backwards" via Closed-loop Training to Mitigate Hallucinations in Multimodal understanding**
  Contributed to the integration of neural error-correction principles into a closed-loop training paradigm, enabling multimodal models to iteratively detect and suppress hallucinations, thereby improving factual grounding and robustness.

- ***(AAAI 2026 Co-First author) CognitionLight: Continue, Rethink, or Rollback? Signaling for Persona-Aware Reasoning in Intelligent Agents**
  Designed and developed a traffic-light–style cognitive control system inspired by neural decision-making, using confidence signals to switch reasoning strategies and enhance multi-turn reasoning stability without retraining.

- ***(AAAI 2026 Co-First author) M³L²: Multi-Agent Multimodal Memory Layer with Lifecycle Control**
  Contributed to a biologically inspired memory framework modeled on the human lifecycle of encoding, retention, and reactivation, implemented via six coordinated agents. Co-developed LabVision-Dial benchmark to assess cross-modal memory in long-horizon tasks, showing improved retention and reduced interference.

- ***(AAAI 2026 Co-First author) Taming the Tri-Space Tension: ARC-Guided Hallucination Modeling and Control for Text-to-Image Generation**
  Contributed to the Hallucination Tri-Space framework modeling semantic, structural, and knowledge tensions. Co-developed the Alignment Risk Code (ARC) for real-time drift quantification and designed the TM-ARC controller for axis-specific corrections, improving faithfulness and stability in T2I generation.

Medical Imaging & Human-Centered Data Analysis

- **Modeling Neuro-Disease Signals from Microstructure to Clinical Imaging**

Research Intern, SCUT School of Medicine, supervised by Prof. Xuegang Xin　　　　　*Oct. 2022 – Nov. 2023*
Built a physics-based numerical simulation to characterize how microstructural properties of brain tissue influence MRI diffusion coefficients in glioma imaging, applying quantitative imaging physics and advanced diffusion modeling to reveal signal‑structure relationships in neuro-oncology data. **One abstract submitted to ISMRM2024 (Second author).**

Research Intern, SCUT School of Future Technology, supervised by Prof. Yanwu Xu　　　　　*Nov. 2024 – Mar. 2025*
Conducted research on AI-driven medical imaging and diagnostic intelligence, spanning neurodegenerative disease analysis and dermatological oncology. **One paper accepted, one paper under review (denoted with *).**

  - **(MICCAI 2025 author) Prior-guided Prototype Aggregation Learning for Alzheimer's Disease Diagnosis**
    Developed a prior-guided prototype aggregation approach for multi-site MRI, integrating heterogeneous imaging features to robustly subtype Alzheimer's disease and improve cross-domain generalization in neurodegenerative disease analysis.
  - ***(Cancer letter Core author) (IF=9.1) Cutting-Edge AI Technologies in Skin Cancer Application**
    Contributed to a comprehensive literature review on AI in skin cancer diagnosis, synthesizing advances in dermoscopic image classification, clinical decision support, and multimodal medical modeling.

- **Enhancing Interpretability in Multimodal Pathology Reasoning**

Research collaborate, University of Manchester , supervised by Prof. Hujun Yin　　　　　*Jan. 2025 – Apr. 2025*
Collaborated on developing interpretable multimodal reasoning methods for computational pathology, focusing on aligning visual lesion features with structured clinical narratives. **One paper accepted.**

  - **(EMNLP 2025 Co-First author) PathoHR: Hierarchical Reasoning for Vision-Language Models in Pathology**
    Designed a hierarchical reasoning framework for pathology VQA that fuses multi-scale lesion representations with structured textual inference, enabling transparent diagnostic reasoning and interpretable decision pathways in computational pathology.

PUBLICATION LIST (* equally contribution, † corresponding arthor)

1. Yu-Xuan Wu*, **Ziyan Huang***, Bin Hu†,Zhi-Hong Guan. RBA-FE: A Robust Brain-Inspired Audio Feature Extractor for Depression Diagnosis. IEEE Transactions on Cognitive and Developmental Systems (TCDS). **(final review pending)**

2. Jianjiang Yang*, **Ziyan Huang***, Yanshu Li. ReLoop: "Seeing Twice and Thinking Backwards" via Closed-loop Training to Mitigate Hallucinations in Multimodal Understanding. Findings of the Association for Computational Linguistics (EMNLP 2025). **(accepted)**

3. Yating Huang*, **Ziyan Huang*,** Lintao Xiang, Qijun Yang, Hujun Yin. PathoHR: Hierarchical Reasoning for Vision-Language Models in Pathology. Findings of the Association for Computational Linguistics (EMNLP 2025). **(accepted)**

4. Yueqin Diao, Huihui Fang, Hanyi Yu, Yuning Wang, Yaling Tao, **Ziyan Huang**, Si Yong Yeo, Yanwu Xu. Prior-guided Prototype Aggregation Learning for Alzheimer's Disease Diagnosis. International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI 2025). **(accepted)**

5. Yueqin Diao, Xiao Chen, **Ziyan Huang**, Qian Tan, Meng Yang, Yanwu Xu, Xing Hu†. Cutting-Edge AI Technologies in Skin Cancer Application. Cancer Letter. **(under review)**

SELECTED AWARDS

1st Prize	Mathematical Contest In Modeling **(Top 7% globally)**	**2023-5**
2nd Prize	MathorCup University Mathematical Modeling Challenge - Big Data Competition (Top 15%)	**2023-3**
2nd Prize	Baidu Paddle Paddle Cup (Top 5%)	**2023-3**
2nd Prize	Asia and Pacific Mathematical Contest in Modeling (Top 15%)	**2023-1**

TECHNICAL SKILLS

Software: C++, MATLAB, Python, SQL, Latex, MS Office
Math: Calculus, Linear Algebra, Probability Theory, Statistic, Discrete Math, Complex Variable
English: TOEFL 102 (Reading:30; Listening:25; Speaking:21; Writing: 26)