# KAIXIN ZHU

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## EDUCATION

9/2021 - 6/2025 **Hong Kong Baptist University**
B.S. in Artificial intelligence
- First class honors degree

## PERSONAL PROFILE

I am pursuing an undergraduate degree in Artificial Intelligence at Hong Kong Baptist University, focusing on **deep learning, computer vision (4D generation), and foundation model (model design)**. My current research goals are to advance and research model design, and to explore transfer learning to inspire their greater potential. Additionally, I am further exploring the field of Artificial Intelligence Science, working towards Artificial Intelligent Generated Content. To deepen my research, I joined Dr. Zhang's lab at the International Machine Learning Research Centre at Peking University as an intern.

As an undergraduate student, I am endeavoring to study and explore to continuously improve my knowledge and skills in the field of artificial intelligence. I participate in courses and projects, actively engage in academic discussions, and try collaborating with my peers to expand my research horizons and collaborative skills.

I am passionate about the development of AI science and want to contribute to the development and application of AI technology through continuous learning and practice. I have ambitions to become an influential AI researcher and hope to contribute to solving complex problems in the real world. I believe that through diligence and hard work, I can continue to grow in this rapidly evolving field and contribute positively to future research and innovation.

## EXPERIENCE

7/2023 – 9/2023 **Medical Image Classification Task for Predicting Monkey Pox Based on RGB Skin Images** **University**
- Followed by Professor Wentao Fan, continued research on medical image classification tasks in transfer learning and proposed a novel transfer learning framework.
- Co-first author of a paper accepted by the 2024 16th International Conference on Machine Learning and Computing.
- Completed an oral presentation as a presenter at ICMLC2024.

`Tensorflow / Keras`

7/2023 – 8/2023 **Fujian Face Network Technology Co.** **Quanzhou, China**
- Intern Engineer (Algorithm)
- Using the Acute Kidney Injury (AKI) dataset provided by the internship, the data was analysed and interpreted using big data techniques and classification algorithms were used to enable prediction of the prevalence of AKI based on underlying physical indicators.

`Pytorch / Hadoop / Spark`

9/2023 – now **Guangdong Provincial Key Laboratory of Interdisciplinary Research and Application for Data Science (IRADS)** **Zhuhai, China**
- Research student
- I formally joined Professor Wentao Fan Natural Science Foundation of Guangdong Province project team, the topic of which was the research on clustering algorithm of high-dimensional spherical data based on deep variational autoencoder, focusing on Spiking Neural Networks and Variational Auto-Encoder.

`Pytorch / Latex / Git`

9/2023 – 5/2024 **Research on Spiking Neural Network** **University**
- Within the final project of our major course in Deep Learning, under the mentorship of Professor Wentao Fan, I collaborated with a research partner to innovate upon the tokenizer architecture within the SNN-Transformer model. We introduced a novel concept: the Custom Advance-Membrane Shortcuts (AMS) blocks. These blocks are meticulously engineered to enhance the computational efficiency and performance of the model, while concurrently minimizing energy expenditure through an optimized residual connection design. The integration of AMS modules augments the model's capacity to process spike-timing encoded information and refines the overall architecture by streamlining the pathways of information transfer. I collaborated with my PhD senior on campus to submit the results in the TNNLS journal.

`Pytorch / Spikingjelly`

3/2024 – now **International Machine Learning Research Centre, Peking University** **Remote**

- During my internship, I had the privilege of working with Mr. Tian, advised by Dr. Zhang and Dr. Yang. Leveraging patient mobility data, we established a robust network and, through the application of target node embeddings, adeptly clustered data from diverse regions. Employing graph neural networks, we unveiled underlying patterns in cross-regional patient care and healthcare resource management, offering valuable insights into the dynamics of medical services. This work, which is a testament to our innovative approach, is poised to enhance the efficiency of healthcare delivery across different geographical areas.
- We commenced an exploratory study on 4D data generation, we find that Recent advances in diffusion models have demonstrated exceptional capabilities in image and video generation, further improving the effectiveness of 4D synthesis. Existing 4D generation methods can generate high-quality 4D objects or scenes based on user-friendly conditions, benefiting the gaming and video industries. However, these methods struggle to synthesize significant object deformation of complex 4D transitions and interactions within scenes. To address this challenge, we propose Trans4D, a novel text-to-4D synthesis framework that enables realistic complex scene transitions. And we have submitted this result to ICLR 2025.

  `Pytorch / Git`

## PUBLICATIONS

PUBLICATION CONFERENCE PROCEEDINGS

**Mpox-PyramidTransferNet: A Hierarchical Transfer Learning Framework for Monkeypox and Dermatological Disease Classification**
Juanxi Tian*, **Kaixin Zhu***, Wentao Fan
Accepted by ICMLC '24: Proceedings of the 16th International Conference on Machine Learning and Computing, 2024

PRE-PUBLICATION CONFERENCE PROCEEDINGS

**Trans4D: Realistic Geometry-Aware Transition for Compositional Text-to-4D Synthesis**
Bohan Zeng, Ling Yang, Siyu Li, Jiaming Liu, Zixiang Zhang, Juanxi Tian, **Kaixin Zhu**, Fu-Yun Wang, Minkai Xu, Stefano Ermon, Wentao Zhang
Submit to the International Conference on Learning Representations (ICLR 2025).

**Spiking Graph Transformer: Bridging Energy Efficiency and Graph Data Processing with Spiking Neural Networks**
Wenchuan Zhang, Juanxi Tian, **Kaixin Zhu**, Wentao Fan
Submit to the IEEE Transactions on Neural Networks and Learning Systems.

## ACHIEVEMENTS

2024 **Undergraduate Group Provincial First Prize** **Great Bay Area, China**
Cross-Strait and Hong Kong-Macao College Student Computer Innovation Competition

2024 **Undergraduate Group Provincial Third Prize** **Great Bay Area, China**
China University Computer Design Competition for Guangdong, Hong Kong and Macau

2024 **Best Poster Award of Computer Science and Technology** **Campus**
The Twelfth Science & Technology Poster Presentation

2024 **Certificate of Achievement** **Shenzhen, China**
ICMLC2024 Oral Presentation

2023 **Best Poster Award** **Campus**
The First Computer Science Related Poster Exhibition

## MEMBERSHIP

2024 **Student Membership**
Institute of Electrical and Electronics Engineers (IEEE)

2024 **Student Membership**
China Computer Federation (CCF)

## SKILLS

**Programming:** Python (Pandas, PyTorch, NumPy, Scikit-learn, etc.), R, Java, HTML, SQL.

**Miscellaneous:** Linux, LATEX (Overleaf/R Markdown), Microsoft Office, Git.

**Soft Skills:** Paper Graphics, Teamwork, Time Management, Communication, Presentation skills

## LANGUAGES

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|---|---|
| **English** | Professional proficiency (University education is all in English) |
| **Mandarin** | Native proficiency |

## INTERESTS

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|---|---|
| **Reading** | I enjoy going for various types of books to enrich my daily life and to add various types of knowledge. |
| **Writing** | I like to try to do some writing in my downtime, such as poetry as well as prose. |
| **Travel** | I love traveling on holiday to experience the life of different cities and the wonders of nature. |