**Haoyu Dong**

Tel: 1‑646‑207‑6669 | Email:  [hd2573@columbia.edu](mailto:hd2573@columbia.edu) | Website: <https://kozmojor.github.io/haoyudong.github.io/>

**education**

# Columbia University New York, NY

*M.S. in Electrical Engineering*, GPA: 4.08/4.0 Aug 2024 - Dec 2025

* **Concentration:** Deep Learning, Signal Processing, Computer Vision
* **Courses:** ECBM 4040 **(A+)**, ELEN 4720, IEOR 6617, CSOR 4231
* Ranked **1st/40** in final exam of ELEN 4720
* Ranked **3rd/130** in Kaggle competition of ECBM 4040 on the topic of CNN Image Recognition

# Xi’an Jiaotong University (XJTU) Shannxi, CN

*B.S. in Automation*, GPA: 3.51/4.3 Sep 2020 - Jul 2024

* **Honors:** Awarded 'Excellent Student' Scholarship, XJTU, Academic Year 2022-2023for top 10% students
* **Concentration:** Machine Learning, Control Theory, Signal Processing
* **Courses:** Modern Control Theory, Signal & DSP, Embedded System, Computer Principle

**research experience**

**Enhanced Kolmogorov–Arnold Representation Theorem based Neural Networks (KAN)** New York, NY

*Researcher, Group Leader* | Advised by Prof. Zoran Kostic Sep 2024 - Dec 2024

* Migrated KAN from PyTorch to TensorFlow, redesigning spline-based activations & dynamic grid refinement for scalable and efficient deployment
* Designed & Conducted 10+ representative experiments, including PDE solving, high-dimensional function fitting, and symbolic regression, achieving up to 35% accuracy improvement and validating KAN’s interpretability and adaptability in the background of AI for Science
* Investigated KAN’s approximation capabilities under Kolmogorov–Arnold Representation Theorem against UAT of MLP, demonstrating solutions to the curse of dimensionality and advancing understanding of neural network scalability

**Rotary Positional Embedding Mechanism on Sparse Attention Architecture** New York, NY

*Researcher* | Advised by Prof. Krzysztof ChoromanskiSep 2024 - Dec 2024

* Implemented *RoPerformer,* a 2D RoPE mechanism to encode relative positional information, achieving improved spatial representation and scalability for attention-based models
* Conducted thorough experiments on the CIFAR-100 dataset, analyzing the trade-offs between absolute and rotary positional embeddings in both classical attention architecture and sparse attention architecture
* Reduced quadratic complexity to near-linear levels by leveraging efficient kernel-based transformations, enabling scalable processing for large token dimensions while maintaining robust performance

**Implementation of Filtering Methods for Non-Gaussian Noise Dynamic Systems** Shannxi, CN

*Researcher* | Advised by Prof. Guanghua Zhang Jan 2024 - Jun 2024

* Focused on the improvement of Kalman Filter (KF) in Non-Gaussian Noise Dynamic Systems
* Introduced MCC into KF to cure traditional KF’s weakness in Non-Gaussian Noise Systems
* Improved KF and got better performance on Mixture Gaussian Noise, evaluated by RMSE

**PROJECT experience**

* Trolley Control Based on LabView and **MyRIO** Mar 2023 - May 2023
* Helicopter Attitude Control under **PID Algorithm** with LabView Mar 2023 - Apr 2023
* **Speech Recognition** Based on Digital Signal Processing (DSP) Technology Sep 2022 - Dec 2022
* Unity-3D Motion-Control based on **Reinforcement Learning** Sep 2022 - Jan 2023

**PubLICATION & RESEARCH REPORT**

**Haoyu Dong**, Jinfan Xiang, Yunfei Ke. [*KAN:Kolmogorov–Arnold Networks.*](KAN.pdf)Final Report for courses ECBM 4040 Neural Networks and Deep Learning.

**Haoyu Dong**, Jinfan Xiang, Wangshu Zhu, Xudong Chen, Zekai Wen. [*Rotary Positional Encodings for ViT and Performer Architectures*.](RoPerformer.pdf) Final Report for courses IEOR 6617 : Machine Learning & High-Dimensional Data Mining.

**Haoyu Dong**. [*Research and Implementation of Filtering Methods for Non-Gaussian Noise Dynamic Systems.*](Maximum-Coentropy-Criterion-based-Kalman-Filtering.pdf) Bachelor’s Thesis at Xian Jiaotong University.

Bai Yu, **Haoyu Dong**, and Qiwei Lian. [*Comparative Analysis of Reinforcement Learning Algorithm based on Tennis Environment*.](Comparative_Analysis_of_Reinforcement_Learning_Alg.pdf) Accepted to CMLAI2023 conference. Published by Highlights in Science, Engineering and Technology 39 (2023): 1146-1152.

**skills**

**Programming:** Python, C, Matlab, Shell, Assembly Language, TensorFlow, Torch

**Language:** English, Chinese(Native), Japanese(Intermediate)