Lizhan Hong

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EDUCATION

Polytechnique de Paris — Paris
Ingénieur — *Feb 2025 – June 2028*

Shanghai Jiao Tong University — Minhang Shanghai
B.S. in Information Engineering & French (Double Degree) (GPA: 3.9) — *Aug 2022 – June 2026*

Zhengzhou Foreign language School — Zhengzhou Henan
H.S. in STEM — *Aug 2019 – June 2022*

PUBLICATION

[1] **Lizhan Hong**, Helin Gong, Hong-Jun Ji, Jialiang Lu, Han Li and Qing Li. "Optimizing near-carbon-free nuclear energy systems: advances in reactor operation digital twin through hybrid machine learning algorithms for parameter identification and state estimation." Nuclear Science and Techniques (2024): n. pag.

[2] Helin Gong, **Lizhan Hong**, Wenbo Zhao, Jiangyu Wang, Hongkuan Liao, Tianya Li, Minxiao Zhong, Qing Li, Chang Chen. Solutioning Inverse Problem for Nuclear Reactor Operational Digital Twin Based on Global-Local Search. Atomic Energy Science and Technology. 2024. (in Chinese)

[3] Haicheng Huang, **Lizhan Hong**, Hongjun Ji, Jialiang Lu, Qing Li, Helin Gong, Advances in Reactor Operation Digital Twin through Decision Tree based Algorithms for Parameter Identification and State Estimation.2024.

[4] Li Han, Jialiang Lu, Hongjun Ji, **Lizhan Hong**, Helin Gong. "A Noise and Vibration Tolerant Resnet for Field Reconstruction with Sparse Sensors."Communications in Computational Physics.2024.

SKILLS

Programming Languages: Python, HTML, SQL, MATLAB, C, Cmake

Deep Learning Frameworks: Tensorflow, PyTorch, Keras

Libraries & Tools: NumPy, Pandas, pyMOR, Scikit-learn, Git

Language Skills: English (Fluent), French (Fluent), Mandarin (Native)

PROJECTS

AI-Informed Operational Digital Twin — Jan 2023 – Feb 2024
Machine Learning Project — *Python, Torch*

- Developed a Nuclear Operational Digital Twin and constructed a Model Order Reduction structure
- Utilized Global Local Search, Singular Value Decomposition AutoEncoder, and hybrid Metaheuristic algorithms to optimize the inverse problem

Immersive Memory Storage and Experience System Based on Unity and Motion Capture Technology — Feb 2023 – Aug 2023
Human motion capture and modeling — *Unity, C Sharp, Chatgpt*

- Collected the gym trainer's movements and developed appropriate virtual models based on Character Creator

AI for Industry Starting-up Project — Feb 2024 – Present
Application Development and Web Building — *Python, HTML, Flask, View*

- Acted as the leader of the team, pitched the business plan and cooperated with social resources
- Implemented Operational Digital Twin models and deployed the corresponding application and website

Manifold Learning in Nuclear Core Management — Aug 2022 – Feb 2023
Applied Mathematics

- Applied manifold learning techniques including Proper Orthogonal Decomposition, Principal Component Analysis, and Locally Linear Embedding to simplify nuclear core data for enhanced predictive modeling.

Elastic Modulus Determination — Aug 2022 – Dec 2022
Mechanical Properties

• Investigated beam theory, derived deflection formulas, and used Matlab for image processing and regression analysis to determine the elastic modulus of steel rulers.

Grain Size Measurement using XRD Aug 2022 – Oct 2022

Material Science

• Employed XRD analysis following Bragg's Law and utilized Origin software for precise measurement, visualization and thus analysis of perovskite oxide grain sizes.

EXPERIENCE

Research Assistant July 2022 – August 2023

AISEA Laboratory *Shanghai, China*

• Developed a **Reactor Operation Digital Twin (RODT)** system with a modular software framework utilizing **Fast Simulated Annealing**, **Cuckoo Search**, **Differential Evolution**, and hybrid **Adam and LBFGS optimizers** for neural networks.

• Addressed challenges in online parameter identification and state estimation for complex systems by proposing solutions to handle non-differentiability and discontinuity in machine learning surrogate models.

• Designed the **hybrid KNNLHS algorithm**, demonstrating real-time efficiency with a 1% prediction error rate and processing times under 0.1 seconds.

• Contributed to the publication of research on **RODT methodology** and the filing of technical patents, promoting the application of digital twin technology in nuclear energy system optimization.

Leader of the Mathematical Modeling Team Sep 2023 – Sep 2023

SJTU math modeling association *Shanghai, China*

• Developed math models like **Centroid Voronoi Tessellation** for the heliostat field optimization strategy

• Deployed the corresponding algorithms in Matlab, and optimized the result by **Partical Swarm Algorithm**

Westlake University PEBBLE Interdisciplinary Camp, Participants and Group Leaders July 2024 – August 2024

Westlake University *Hangzhou, China*

• As a group leader, organized Master's students and Ph.D. students from Japan, India, and South Korea to complete the research topic "Study on Self-Adaptation Phenomena of Biological Networks Based on the Law of Localization".

International Youth Leadership Finance Summit Quant Competition December 2024

Shanghai Advanced Institute of Finance, Shanghai Jiao Tong University *Shanghai, China*

• Data modeling and strategy backtesting with machine learning methods such as MACD, Ledoit Wolf, and LSTM, resulting in a strategy with a Sharpe Index of 5 on the test set and a return of more than 100% over three years

CERTIFICATIONS

• 2024 Ivy League Capital Scholarship

• National Second Prize winner of the China Undergraduate Mathematical Contest in Modeling

• Shanghai Undergraduate Bodybuilding Champion

• Silver Award winner of the Sheng Xuanhuai Innovation and Entrepreneurship Competition at Shanghai Jiao Tong University

• 2023 C-class Excellence Scholarship recipient at Shanghai Jiao Tong University