Lizhan Hong

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Education

École Polytechnique — Paris
Engineer's Cycle — *Feb 2025 – Jun 2027*
Shanghai Jiao Tong University — Minhang Shanghai
Bachelor's Degree in Information Engineering & French (GPA: 3.9) — *Aug 2022 – Jun 2026*
Zhengzhou Foreign Languages High School — Zhengzhou Henan
STEM High School Student — *Aug 2019 – Jun 2022*

Publications

[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] Rong Zhao, **Lizhan Hong**, Hongjun Ji, Qinyi Zhang, Shiquan Zhang, Qing Li and Helin Gong. "Decision tree based parameter identification and state estimation: Application to Reactor Operation Digital Twin." Nuclear Engineering and Technology (2025): n. pag.

[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 : French (fluent), English (fluent), Mandarin (native), Spanish (beginner)

Projects

- **AI-Driven Industrial Launch Project** (Feb 2024 – Present)
  Development of applications and creation of websites
  Skills: Python, HTML, Flask, Vue
  - Team leader role, business plan presentation, and collaboration with social resources.
  - Implementation of digital twin models for operation and deployment of corresponding applications and websites.
- **AI-Informed Operational Digital Twin** (Jan 2023 – Feb 2024)
  Machine Learning Project
  Skills: Python, PyTorch
  - Development of a digital twin for nuclear reactor operation and construction of a model order reduction structure.
  - Use of 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
  Skills: Unity, C Sharp, ChatGPT
  - Collection of gym trainer movements and development of appropriate virtual models based on Character Creator.

- **Manifold Learning in Nuclear Core Management** (Aug 2022 – Feb 2023)
  Applied Mathematics
  - Application of manifold learning techniques including Proper Orthogonal Decomposition, Principal Component Analysis, and Locally Linear Embedding to simplify nuclear core data for improved predictive modeling.
- **Determination of Elastic Modulus** (Aug 2022 – Dec 2022)
  Mechanical Properties
  - Examination of beam theory, derivation of deflection formulas, and use of Matlab for image processing and regression analysis to determine the elastic modulus of steel rods.
- **Grain Size Measurement by XRD** (Aug 2022 – Oct 2022)
  Materials Science
  - Use of XRD analysis following Bragg's Law and Origin software for measurement, visualization, and precise analysis of perovskite oxide grain sizes.

EXPERIENCE

- **Summit International Quant Finance and Young Leadership Competition** (December 2024)
  Shanghai Advanced Institute of Finance, Shanghai Jiao Tong University
  Shanghai, China
  - Data modeling and backtesting of strategies using machine learning methods such as MACD, Ledoit Wolf, and LSTM, resulting in a Sharpe ratio of 5 on the test set and over 100% return over three years.
- **PEBBLE Interdisciplinary Camp at Westlake University, Participants and Group Leaders** (Jul 2024 – Aug 2024)
  Westlake University
  Hangzhou, China
  - As group leader, organized master's and doctoral students from Japan, India, and South Korea to complete the research topic "Study of the Self-Adaptation Phenomenon of Biological Networks Based on Localization Law."
- **Mathematical Modeling Team Leader** (Sep 2023 – Sep 2023)
  SJTU Mathematical Modeling Association
  Shanghai, China
  - Development of mathematical models such as **Centroid Voronoi Tessellation** for heliostat field optimization strategy.
- **Research Assistant** (Jul 2022 – Aug 2023)
  AISEA Laboratory
  Shanghai, China
  - Development of a Reactor Operation Digital Twin (RODT) system with a modular software structure using **Fast Simulated Annealing**, **Cuckoo Search**, **Differential Evolution**, and hybrid **Adam and LBFGS** optimizers for neural networks.
  - Addressed challenges of 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 prediction error rate of 1% 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.

AWARDS AND COMPETITIONS

- Ivy League Capital Scholarship 2024
- National Second Prize in China for University Mathematical Modeling Contest
- Bodybuilding Champion, Shanghai Intercollegiate Cup
- Silver Award Winner of the Sheng Xuanhuai Innovation and Entrepreneurship Contest at Shanghai Jiao Tong University
- Recipient of Category C Excellence Scholarship at Shanghai Jiao Tong University in 2023