Yizhou Ding

📞 Phone: (+86) 17771393926 ✉ jasondean910@outlook.com 🌐 https://jasonmils.github.io
🔤 IELTS: 7.5 (Listen:8; Reading:7.5; Writing:6.5; Speaking:7.5)

Education

- **Université Paris Sciences & Lettres (QS ranking 24)** — Paris, France
  Master de Sciences, Technologies, Sante, Mention Energie; **Supervisor:** *Prof. George Caralis* — *Sep. 2021 – Jun. 2024*

- **Huazhong University of Science and Technology (985 Program)** — Wuhan, China
  Master of New Energy Science and Engineering; **Supervisor:** *Prof. Yuanzheng Li* — *Sep. 2021 – Jun. 2024*

- **Wuhan University of Technology (211 Program)** — Wuhan, China
  Bachelor of Communication Engineering; GPA: 3.71/4.00; — *Sep. 2017 – Jun. 2021*

Research Interest

† **Main Interest:** Adaptive Machine Learning; Deep Learning; Spatial-temporal Graph Learning; Semi-supervised Representation Learning; Federated Learning.

† **Application-level Interest:** Smart Grid Analysis; Power System Operation; Renewable Energy Forecast.

Publications

1. Li, Y. (Advisor), **Ding, Y.**, Liu, Y., Yang, T., Wang, P., Wang, J., and Yao, W, "Dense skip attention based deep learning for day-ahead electricity price forecasting", in *IEEE Transactions on Power Systems*, 2022, doi: 10.1109/TP-WRS.2022.3217579. [PDF]

2. Zhou, Y., Liang, H., Zou, X., **Ding, Y.*** (Corresponding Author), "Topology Identification of Distribution Networks Based on Physics-Informed Latent Graph Attention Network", *2023 3rd International Joint Conference on Energy, Electrical and Power Engineering (COEEPE)*, 2023, accepted.

3. Li, Y. (Advisor), Long, X., Li, Y*, **Ding, Y.**, Yang, T., Zeng, Z., "A Demand-Supply Cooperative Responding Strategy in Power System with High Renewable Energy Penetration", in *IEEE Transactions on Control Systems Technology*, 2023.

4. Li, Y. (Advisor), **Ding, Y**, He, S., Li, Y., Gao, L., Zeng, Z., Chung, C., "Privacy-Preserving Graph Inference Network for Multi-Entity Wind Power Forecast: A Federated Learning Approach", in *IEEE Transactions on Sustainable Energy*, 2023, under review.

5. **Ding, Y.**, Li, Y. (Advisor), "Elicit Compact Representation Learning on Renewable Energy Forecast based on Closed-loop Self-Supervision", 2023, in prep..

6. Li, Y. (Advisor), **Ding, Y**, et al., "AI for Renewable Power System Operation", *Nature Review Electrical Engineering*, 2023, under review.

7. Li, Y. (Advisor), **Ding, Y**, et al., "Renewable Energy Utilization via Power System Operation: A System Engineering Perspective", *Nature Communications*, 2023, under review.

Research Experience

- **Artificial Intelligence (AI) for Renewable Power System Operation** — Wuhan, China
  Advisor: Prof. Yuanzheng Li and Prof. Hoay Beng Gooi — *Mar. 2023 - Present*

  - **Objectives**: Presented an overview of current artificial intelligence techniques employed in the renewable power system operation; Explored the applicability of these techniques to different operational problems; Discussed potential trends in renewable power system development and prospective approaches to address the ever-evolving operational challenges.
  - **Contribution**: Provided a summary of the predictive methods used in the "source-load-grid" components of the renewable power system operation in the context of the dual-carbon goal as well as the application of AI methods in various types of prediction; Wrote the "forecasting" part of the paper entitled "AI for Renewable Power System Operation".

- **Elicit Compact Representation in Renewable Energy (RE) Forecasting**   Wuhan, China
  Independent research   *Jan. 2023 - Present*
  - **Objectives**: Explored informative representation of stochastic RE generation datasets; Exploited the RE representation to effectively generate multi-horizon forecast both in determinstic and interval way.
  - **Contribution**: Designed a unified representation learning scheme for RE forecasting; Developed a contrastive& contractive encoder to elicit intricate RE characteristics; Proposed a complementary downstream regressor to distill the representation to predictions; Established an effective interval forecast sheme based on the generated representation.

- **Topology Identification for Distribution Network (DN) with PV Integration**   Wuhan, China
  Independent research   *Jan. 2023 - Jul. 2023*
  - **Objectives**: Abstracted topological identification into a multi-classification problem; Estimated the topology of the DN precisely with only voltages given in each node; Designed effective method to exploit the physical information underlies the topology of DN.
  - **Contribution**: Constructed concrete graph representation based on real topology of IEEE 33 bus system; Developed a graph-learning framework to identify the topology of DN in different time slot; Combined sub-graphs into a sparsified graph representation to enable multiple mini-batch training scheme.

- **Privacy-Preserving Multi-entity Wind Power Forecast (MWPF)**   Wuhan, China
  ***Advisor:** Prof. Yuanzheng Li*   *May. 2022 - Present*
  - **Objectives**: Accomplished multi-entity wind power forecasting without breaching the privacy across clients; Developed a cooperative privacy-preserving MWPF method to solve the data silo dilemma; Elicited *spatial-temporal dependencies* in the wind-related meteorological features to reduce the uncertainties in wind power prediction.
  - **Contribution**: Proposed a collaborative privacy-preserving framework for MWPF based on federated learning; Built a high-capacity graph learning model named Graph Inference Network (GIN) for local model pruning; Created a structure-independent dynamic graph inference block to efficiently elicit the *spatial interdependencies*; Designed a customized federated learning protocal to address the *heterogeneous temporal depedencies*.

- **Attention-Based Day-Ahead Electricity Price (DAEP) Prediction**   Wuhan, China
  *Key Scientific and Technological Research Project of State Grid Corporation; **Advisor:** Prof. Yuanzheng Li*   *Jan. 2021 - Jul. 2022*
  - **Objectives**: Explored the internal *temporal* and *feature-wise variability* of the electricity price in the liberalized power markets; Addressed these two challenges in the DAEP forecasting by developing effective deep learning models.
  - **Contribution**: Designed an end-to-end framework to automatically read the price data files and to predict the DAEP using historical price-related data; Constructed an advanced deep learning block to extract the *temporal variability*; Developed a dense skip attention block which enables the model to automatically distinguish and emphasize the critical features in an effort to deal with *feature-wise variability*.

PROJECT & TEAMWORK EXPERIENCE

- **AI-Enabled Computational Methods for Smart Grid Forecast and Dispatch**   Wuhan, China
  Participated in Book Manuscript Writting   *Aug. 2022 - Oct. 2022*
  - **Objectives**: Reported novel breakthroughs in intelligent decision-making approaches for optimization of smart grid dispatch; Presents recent development of deep learning and machine learning in smart grid forecast problems.
  - **Contribution**: Wrote the Chapter IV and VI in the book titled "*Artificial Intelligence Enabled Computational Methods for Smart Grid Forecast and Dispatch*". [PDF]

- **Distributed Harmonics Monitor & Mitigation in Large-scale Public Buildings**   Wuhan, China
  National First Prize (Top 2.2%) Project   *Oct. 2019 - Aug. 2020*
  - **Objectives**: Designed a distributed smart harmonics monitor & mitigation system for the electrical system in large-scale public buildings to improve energy efficiency.
  - **Contribution**: Adopted distributed method to replace the centralized harmonic mitigation; Conducted an active power filter sub-system simulation using Simulink; Designed a smart grid harmonic mitigation mechanism based on edge computing; Developed a hardware device based on STM32 and MSP to achieve grid data acquisition, data transmission, and command reception;

Honors & Awards

National Scholarship — Oct. 2023
Ministry of Education of the People's Republic of China

First Prize Academic Scholarship for Postgraduate (three times) — Oct. 2023 & Oct. 2022 & Oct. 2021
Huazhong University of Science and Technology

Interdisciplinary Contest In Modeling (ICM) — May 2023
Honorable Mention (**Global Top 30**%) — Team member

Asia and Pacific Mathematical Contest in Modeling (APMCM) — Jan. 2023
Third Prize in Asia Pacific region — Team leader

"Double Carbon" Innovation and Creativity Competition for Postgraduate — Jan. 2023
Third Prize in China region — Team member

Merit Student — Sep. 2022
Huazhong University of Science and Technology

Outstanding Graduate — Jun. 2021
Wuhan University of Technology

Postgraduate Candidate Exempt from Admission Exam — Sep. 2020
Ranked **6/57 (10.5%)** in all exemplary candidates

National University Student Social Practice and Science Contest on ESER — Aug. 2020
National First Prize (**Top 2.2%**);   **ESER**: Energy Saving and Emission Reduction — Team member

National College Student Innovation and Entrepreneurship Training Program — Aug. 2020
Completed the national project with excellence — Team leader

Third Prize of National Undergraduate FPGA Innovation Design Competition — Nov. 2019
Third Prize in China region — Team leader

National Undergraduate Electronics Design Contest — Aug. 2019
Third Prize in Hubei Province — Team leader

Merit Student (two times) — Sep. 2018 & Sep. 2019
Wuhan University of Technology

First Class Scholarship for Undergraduate — Jun. 2018
Wuhan University of Technology

Academic Service

- **Peer Reviewers** — Jul. 2023
  IEEE Transactions on Intelligent Vehicles, top journal in engineering — *JCR Q1*
- **Peer Reviewers** — Sep. 2022
  Journal of Modern Power Systems and Clean Energy — *JCR Q2*
- **Peer Reviewers** — Jul. 2022
  Applied Energy top journal in engineering — *JCR Q1*

Extracurricular Experience

- **Point-Corp Future Entrepreneur School** — Wuhan, China
  Advisor: *Prof. Yu Liu, CEO of Dian Organization* — *Mar. 2023 - Jun. 2023*
- **Global Youth Leadership Academy (GYLA)** — Turin, Italy & Wuhan, China
  Advisor: *Dr.Liangrong Zu, Founder of GYLA, Senior Official of United Nations* — *Jan. 2021 - Feb. 2021*