Chenxi Hu

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EDUCATION

The University of Hong Kong *Sep. 2021 - Sep. 2025*
Ph.D. in Electrical Engineering (*HKU Presidential PhD Scholarship)*
Supervisor: Prof. Yunhe Hou / **Co-Supervisor**: Prof. K.T. Chau

Wuhan University *Sep. 2016 - Jun. 2020*
Major: B.E. in Electrical Engineering / **Minor:** Finance GPA: 3.94/4.0 | Rank: 1/304

RESEARCH INTERESTS

Resilient planning of power system

Optimization and decision-making under uncertainty

Artificial Intelligence and its application in energy systems

EXPERIENCE

HKU Shenzhen Institute of Research and Innovation *Mar.2023 - Sep.2025*
Research Assistant

University of Wisconsin-Madison *Jul.2024 - Dec.2024*
Visiting Scholar - **Advisor**: Prof. Line Roald

Ant Group *May 2021 – Aug. 2021*
Software Engineer Intern

University of California, Los Angeles *Jul. 2019 – Sep. 2019*
Research Intern, The Cross-disciplinary Scholars in Science and Technology (CSST) Program

New York University, Shanghai *Jun. 2018 – Aug. 2018*
Research Intern, The NYU Shanghai Summer Undergraduate Research Program (SURP)

PUBLICATION

Journal Papers

➢ **Published**

J1 **Chenxi Hu**, Yujia Li, and Yunhe Hou, "Risk-informed Resilience Planning of Transmission Grids Against Ice Storms." ***Applied Energy***, vol. 392, pp. 125801, 2025.

J2 **Chenxi Hu**, Jun Zhang, et al, "Black swan event small-sample transfer learning (BEST-L) and its case study on electrical power prediction in COVID-19." ***Applied Energy***, vol. 309, pp. 118458, 2022.

J3 Jiazuo Hou, **Chenxi Hu**, Shunbo Lei, Liang Liang, and Yunhe Hou, "Security region of inverter-interfaced power systems: Existence, expansion, and application." ***Renewable and Sustainable Energy Reviews***, vol. 192, pp. 114222, 2024.

J4 Jiazuo Hou, **Chenxi Hu**, Shunbo Lei, and Yunhe Hou, "Cyber resilience of power electronics-enabled power systems: A review." ***Renewable and Sustainable Energy Reviews***, vol. 189, pp. 114036, 2024.

J5 Ruizhang Yang, Yujia Li, **Chenxi Hu**, and Yunhe Hou, "ExDiffusion: Classifier-Guidance Diffusion Model for Extreme Load Scenario Generation with Extreme Value Theory." ***IEEE Transactions on Smart Grid***, vol. 16, no. 5, pp. 3887-3903, 2025.

J6 Yujia Li, Shunbo Lei, Wei Sun, **Chenxi Hu** and Yunhe Hou, "A Distributionally Robust Resilience Enhancement Strategy for Active Distribution Networks Considering Decision-dependent Contingencies," ***IEEE Transactions on Smart Grid***, vol. 15, no. 2, pp. 1450-1465, 2024.

➢ **Under Review**

J7 **Chenxi Hu**, Shunbo Lei, Yujia Li, and Yunhe Hou, "Decision-Dependent Resilience Enhancement for Distribution Systems Against Endogenous Wildfires." (***IEEE Transactions on Smart Grid***)

J8 **Chenxi Hu**, Shunbo Lei, and Yunhe Hou, "Decision-dependent Distributionally Robust Resilience Enhancement Strategy against Endogenous Wildfire." (***IEEE Transactions on Smart Grid***)

J9 **Chenxi Hu**, Yue Ma, and Yunhe Hou, "Learning to Forecast the Unpredictable: Adaptive Conditional Neural Processes for Extreme Electricity Load Forecasting." (***NeurIPS 2025***)

J10 Ziqing Zhu*, **Chenxi Hu***, Ziying Chen, Yunhe Hou, and Jinyue Yan, "Will cross-boundary electricity market integration be the solution or poison in face of future energy crisis?" (***Joule***) (*equal contribution)

J11 Jingxian Zhou, **Chenxi Hu**, Siqi Bu, and Ziqing Zhu, "Scalable Quantum-assisted Optimization Framework for Three-Stage Resilience Improvement in Distribution Networks." (***Advances in Applied Energy***)

Conference Papers

C1 **Chenxi Hu**, Jiazuo Hou and Yunhe Hou, "Security Assessment of Power System with Stochastic Uncertainty Based on Steady-state Controllable Distance," *2022 IEEE PES Innovative Smart Grid Technologies - Asia (ISGT-Asia)*, 2022, pp. 434-438.

C2 **Chenxi Hu**, Hongxia Yuan, Jun Zhang,et al."Mid-Long Term Electricity Consumption Forecasting Analysis Based on Cyber-Physical-Social System Architecture," *16th International Conference on Automation Science and Engineering (CASE)*, Hong Kong, China, 2020, pp. 564-569.

C3 Yujia Li, **Chenxi Hu**, and Yunhe Hou, "The Value of Ambiguity Quantification in Distributionally Robust Economic Dispatch Models for the Wind-Penetrated Power System," *2023 IEEE PES GTD International Conference and Exposition (GTD)*, 2023.

Book Chapters

B1 Yujia Li, **Chenxi Hu**, et al, "Resilience of Transmission Systems," In *Power Grid Resilience: Theory and Applications*. pp. 47-108. Cham: Springer Nature Switzerland, 2025.

TALKS & PRESENTATIONS

T1 "Existence of Power Flow Solutions in Inverter-Dominated Power Systems", *2025 IEEE PES General Meeting*, Austin, U.S, July 2025.

T2 "Risk-Informed Resilience Enhancement of Transmission Grids Against Ice Storms", *2025 INFORMS International Meeting*, Singapore, July 2025. (**Session Chair**)

T3 "Decision-Dependent Resilience Enhancement for Distribution Systems Against Endogenous Wildfires", *2024 C3E Women in Clean Energy Symposium*, Stanford University, Stanford, U.S, November 2024.

T4 "Resilience Enhancement Strategy of Grid-Interactive Efficient Buildings Using Reinforcement Learning", *2024 INFORMS Annual Meeting*, Seattle, U.S, October 2024.

T5 "Decision-Dependent Resilience Enhancement for Distribution Systems Against Endogenous Wildfires", *2024 IEEE PES General Meeting*, Seattle, U.S, July 2024.

T6 "Risk-Informed Resilience Enhancement of Transmission Grids Against Ice Storms", *2023 INFORMS Annual Meeting*, Phoenix, U.S, October 2023.

T7 "Enhancing Resilience of Grid-Interactive Efficient Buildings Using Reinforcement Learning", *2023 IEEE PES General Meeting*, Orlando, U.S, July 2023.

T8 "Information-theoretic Method in Power System", *2022 INFORMS Annual Meeting*, Indianapolis, U.S, October 2022.

T9 "Security Assessment of Power System with Stochastic Uncertainty Based on Steady-state Controllable Distance", *2022 IEEE Innovative Smart Grid Technologies - Asia*, Singapore, October 2022.

RESEARCH PROJECT

Distributionally Robust Decision-dependent Resilience Enhancement Strategy against Endogenous Wildfire *Aug. 2024 – Mar. 2025*

The National Natural Science Foundation of China (NSFC), participant

- Developed a decision-dependent ambiguity set that captures complex decision-dependent uncertainties (DDU) by incorporating wildfire-induced uncertainty and model misspecification.
- Developed a decision-dependent distributionally robust resilience enhancement model and designed a customized column-and-constraint generation algorithm to efficiently solve the resulting DRO problem involving complex DDUs.

Adaptive Load Forecasting under Extreme Events *Jul. 2024 – Dec 2024*

- Developed an adaptive conditional neural process that learns target-aware similarity weights for few-shot load forecasting under extreme events, reducing mean-squared error by up to 22% on PJM and ISO-NE datasets while delivering well-calibrated uncertainty predictions.

Decision-Dependent Resilience Enhancement for Distribution Systems Against Endogenous Wildfire *Mar. 2024 – Jul. 2024*

The National Natural Science Foundation of China (NSFC) - Participant

- Developed a novel model for decision-dependent uncertainties in endogenous wildfire, capturing how ignition and cascading failure risks evolve with infrastructure planning decisions.
- Developed a two-stage wildfire-preventive decision-dependent resilience enhancement model to improve wildfire preparedness.

Cross-Boundary Electricity Market Integration under Energy Crises: Implications for Social Welfare and Policy Coordination *Jan. 2024 – Dec. 2024*

- Developed machine learning–based crisis scenario models using historical electricity price, load, weather, and natural gas supply data to capture impacts of policy interventions and extreme weather events on electricity prices.
- Integrated data-driven forecasting with power flow optimization to evaluate effects of unilateral price caps, transmission expansion, and higher renewable penetration on cross-border price divergence and social welfare.

Risk-informed Resilience Planning of Transmission Systems Against Ice Storms

The National Natural Science Foundation of China (NSFC) - Participant *Mar. 2023 – Dec. 2023*

- Developed a resilience planning model that integrates predictive information uncertainty, decision-dependent component failure risks, and exogenous extreme weather threats, enabling coordinated planning consideing various conditions.
- Developed a scalable progressive hedging algorithm to efficiently solve the large-scale stochastic mixed-integer programming problem.

Constructing the Steady-state Security Region of Power System *Sep. 2021 – Dec. 2022*

Research Program of Control and Dispatch Center, State Grid of China Co. Ltd. - Participant

- Derived DC power flow-based security region for the security assessment of renewable energy.
- Derived AC power flow-based security region grounded on DC solutions and established solvability guarantees using the Poincaré–Miranda theorem.

Enhancing Resilience of Grid-Interactive Efficient Buildings Against Heat Waves Using Reinforcement Learning *May. 2023 – present*

Shenzhen-Hong Kong-Macau Science and Technology Program - Participant

- Developed an online resilience-oriented energy management method for the grid-interactive efficient building clusters via the Proximal Policy Optimization Algorithm.

Small-sample Transfer Learning Framework for Black Swan Events *Dec. 2020 – May 2022*

Research Program of state grid corporation of china - Participant

- Proposed a transfer learning framework for few-shot forecasting. Achieved 94% forecasting accuracy across provinces in Central and Eastern China and over 13% improvement over machine learning baselines during COVIS-19.

Dynamic Characteristics Analysis of Central China's Socio-economic Structure and Electricity Market based on Social Computing and Artificial Intelligence

Research Program of state grid corporation of china - Participant *Oct. 2019 – Dec. 2020*

- Constructed a mid-term load forecasting model based on Deep Belief Network using the economic and electricity data in China with 97% forecasting accuracy.
- Constructed a mixed-frequency load forecasting model using Long Short-Term Memory network with 98% accuracy, delivering over 5% improvement versus machine learning baselines.

TEACHING EXPERIENCE

ELEC7023 Capstone Workshop

Teaching Assistant, 2024-2025 (27 students)

- Designed tutorials on advanced optimization and AI methods for power system applications, covering convex/nonconvex programming, stochastic and robust methods, and AI models.
- Led hands-on coding labs using Python/MATLAB, guiding students through full-stack pipelines, such as data preparation, algorithm implementation, solver/model configuration, benchmarking, and result visualization.
- Advised students on optimization formulation, reproducibility, and performance, including variable/constraint modeling, solver tuning (Gurobi, CPLEX, Mosek), and deep learning frameworks (PyTorch, TensorFlow).

ELEC4147 Power System Analysis and Control

Teaching Assistant, 2023-2024 (23 students), 2024-2025 (37 students)

Recognized as "Well-Performed TA"

- Led weekly tutorials and assignment walkthroughs on power system analysis, including power flow analysis, fault analysis, economic dispatch algorithms, and stability analysis.
- Conducted laboratory sessions on nonlinear system behavior; prepared code scripts, supported result reproducibility, and guided interpretation of system response.
- Provided feedback on assignments and lab reports, held office hours, and helped students reason through model assumptions, parameter sensitivity, and stability margins.

ELEC7021/7022 Dissertation & Project

Teaching Assistant, 2023-2024

- Supervised MSc thesis projects, helping students refine research questions, and select appropriate modeling paradigms (e.g., optimization or AI).
- Advised on advanced methods for solving optimization problems in industrial systems, including mixed-integer linear programming (MILP), stochastic/robust models, and decomposition algorithms (e.g., Benders, column-and-constraint generation); supported implementation using Gurobi, CPLEX, and Mosek.

- Introduced AI techniques for time-series forecasting, such as CNNs, LSTMs, and Transformer architectures, implemented in PyTorch and TensorFlow.
- Provided iterative feedback on problem formulation, experimental design, data analysis, and academic writing; promoted reproducible workflows and maintained academic integrity.

  Projects included:

  - Miss Xiaojing Liu: "Research on Multiple Time Scale Scheduling Strategy of Source-Load-Storage Coordination"
  - Ms Zhipeng Hu: "Study on Optimization Reconfiguration and Service Restoration for Distribution Network with High Penetration of Renewable Energy"

SERVICE

Journal Reviewer: IEEE Transactions on Power Systems, IEEE Transactions on Smart Grid, IEEE Transactions on Industrial Informatics, Applied Energy, International Journal of Electrical Power and Energy, Journal of Modern Power Systems and Clean Energy, IET Smart Grid

AWARDS AND SCHOLARSHIPS

- **CLP Fellowship in Electrical Engineering** *Sep. 2023*
- **HKU Presidential PhD Scholarship** *Sep. 2021*
- **HKU Y S and Christabel Lung Scholarship** *Sep. 2021*
- **Outstanding Graduate of Wuhan University** *Jun. 2020*
- **The Ultra High Voltage(UHV) Scholarship** *Nov. 2019*
- **The Cross-disciplinary Scholars in Science and Technology Scholarship of University of California, Los Angeles** *Jun. 2019*
- **National Scholarship (Top 1%)** *Nov. 2018*
- **Wuhan University First-class Scholarship** *Nov. 2018*
- **National Scholarship (Top 1%)** *Nov. 2017*
- **Wuhan University Freshman Scholarship** *Sep. 2016*

SKILLS

- **Programming:** Python, Julia, MATLAB
- **Optimization:** Distributionally robust optimization, stochastic programming, mixed-integer programming and related techniques
- **Machine Learning:** Reinforcement learning, deep learning (PyTorch, TensorFlow), and applications in decision-making