

Chuanqing Pu

PhD Candidate | Shanghai Jiao Tong University

I am currently a PhD candidate specializing in probabilistic forecasting and uncertainty-aware/data-driven optimization for power systems. I am passionate about **data engineering**, especially skilled in time-series forecasting and optimization modeling. I also maintain a personal **Blog** and **GitHub repositories** where I share insights and projects in data science.



Contact

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[Google Scholar](#) [Personal Website](#)
[Blog](#) [GitHub \(69 stars\)](#)

Education

Ph.D. in Electrical Engineering 2023 – Present
Shanghai Jiao Tong University (Supervisor: Feilong Fan)
B.E. in Electrical Engineering 2019 – 2023
Sichuan University

Research Interests

- Time Series Forecasting (Renewable Energy, Electricity Price), Learning-based Optimization, Uncertainty-aware Optimization, Decision-focused Learning on Predict-and-Optimize Pipeline

Research Experience

1. LLM4 Energy Forecasting & Optimization (In progress)

- **Zero-shot Renewable Energy Forecasting through Vision-Language Models** Dec 2025 – Present
 - **Motivation:** A fundamental limitation of statistical learning-based renewable energy forecasting methods is their strong reliance on site-specific historical data for end-to-end customized training. Newly commissioned renewable energy plants often lack sufficient operational data, making reliable forecasting infeasible.
 - **Approach:** Formulate cold-start forecasting as a vision-driven zero-shot trajectory prediction problem; propose a VLM-based retrieval-augmented framework where semantic representations enable cross-domain generalization; estimate future trajectories via local conditional expectation in representation space.
- **LLM-based Frameworks for Power Engineering from Routine to Novel Tasks** Mar 2023 – Oct 2023
 - Develop LLM-based pipelines supporting routine-to-novel engineering tasks (problem specification, reasoning, and assistance) for more generalizable forecasting/analysis.

2. Decision-Focused Learning for Predict-then-Optimize in Power Systems

- **Decision-Focused Continual Learning for Seaport Varying Tasks Stream** Jan 2025 – Present
 - **Motivation:** Decision-focused learning aligns the training of forecasting models with downstream decision outcomes. However, this end-to-end design inherently restricts the value of forecasting models to only a specific task structure, and thus generalize poorly to evolving tasks.
 - **Approach:** Propose a decision-focused continual learning framework that adapts online to streaming tasks; use Fisher-information regularization to preserve task-critical parameters; develop a differentiable convex surrogate to stabilize backpropagation.
- **Value-oriented Forecasting for Stability-Constrained Renewable Energy Operation** Sep 2023 – Mar 2024
 - **Motivation:** Minimizing statistical errors alone in renewable energy forecasting often neglects how errors impact stability and economic operation.
 - **Approach:** Embed power-system stability models into the forecasting loss to quantify deliverable transmission power; develop an implicit-differentiation training algorithm enabling end-to-end backpropagation.

3. Learning to Optimize Seaport Energy–Logistics Scheduling

Jun 2024 – Dec 2024

- **Motivation:** Seaport energy–logistics co-optimization can be modeled as a large-scale mixed-integer program; solver scalability is limited, and day-to-day re-optimization from scratch is costly.
- **Approach:** Combine distributed optimization (ADMM) with ML-based warm starts; train a neural network to predict high-quality initial solutions from historical data, accelerating convergence while preserving optimality.

4. Renewable Energy Forecasting (Winning Solution of IEEE HEFTCom)

Dec 2023 – Jun 2024

- Develop a hybrid wind–solar probabilistic forecasting and trading framework: multi-source NWP ensemble stacking; Quantile-LASSO online post-processing; probability density aggregation; stochastic day-ahead trading under electricity price uncertainty

Main Publications

- Chuanqing Pu, Feilong Fan, Nengling Tai. “Zero-shot Renewable Energy Nowcasting via Vision–Language Models.” **under preparation**.
- Chuanqing Pu, Feilong Fan, Nengling Tai, Yan Xu, Wentao Huang, Honglin Wen. “Predict-then-Optimize for Seaport Power-Logistics Scheduling: Generalization across Varying Tasks Stream.” *IEEE Transactions on Smart Grid*, **under review**.
- Chuanqing Pu, Feilong Fan, Nengling Tai, *et al.* “A Hybrid Strategy for Probabilistic Forecasting and Trading of Aggregated Wind-Solar Power: Design and Analysis in HEFTCom2024.” *International Journal of Forecasting*, 2025.
- Feilong Fan, Chuanqing Pu, Nengling Tai, *et al.* “Distributed Stochastic Operation of Low-Carbon Port Energy-Logistics Systems via Learning to Warm-Start.” *IEEE Transactions on Industrial Applications*, 2025. (**Conceptualization, Methodology, Experiments, Writing**)
- Feilong Fan, Chuanqing Pu, Jun Wang, Nengling Tai, Hongqiao Peng, Qifen Li. “Transmission Power-oriented Forecasting towards Stability-Constrained Operation of Renewable Energy Power Plants with Energy Storages.” *CSEE Journal of Power and Energy Systems*, 2025. (**Conceptualization, Methodology, Experiments, Writing**)
- Jinming Yu, Chuanqing Pu, Zhenlan Dou, Chunyan Zhang, Jianfeng Li, Feilong Fan. “End-to-End Forecasting Towards Economic Operation of Microgrid Using Derivative-Free Learning.” *IEEE iSPEC 2024*. (**Methodology, Experiments**)
- Ran Li, Chuanqing Pu, Junyi Tao, Canbing Li, Feilong Fan, Yue Xiang, Sijie Chen. “LLM-based frameworks for power engineering from routine to novel tasks.” *arXiv:2305.11202*. (**Conceptualization, Methodology, Experiments, Writing**)
- Chuanqing Pu, Yue Xiang, Feilong Fan, *et al.* “Flexible Coordination of Wind Generators and Energy Storages in Joint Energy and Frequency Regulation Market.” *In PandaFPE*, 2023. (**Best Paper, Best Oral Presentation**)

Data Engineering Experience & Awards

IEEE HEFTCom24: Hybrid Energy Forecasting & Trading Competition

Jan 2024 – Jun 2024

 **Best Student Team (1st Place)** (Probabilistic Forecasting & Stochastic Optimization)

- Achieved the lowest average pinball loss and the highest trading profit among all 70+ international teams; invited presentation at ISF 2024 (keynote) and orsted science talk; the research paper is invited to submit to *IJF*.
- Links:  practical code  research code (26 stars)  paper

THS Forecasting Hackathon (ISF 2025)

Jul 2025

 **First Prize (1st Place)** (Time Series Forecasting)

- Time-limited on-site forecasting competition on quarterly inbound tourism arrivals to Hong Kong and Macao (2023–2025). Achieved the lowest MAE via time-series analysis and machine learning skills.

Kaggle: Hull Tactical Market Prediction

Oct 2025 – Dec 2025

 **Ongoing** (Forecasting & Optimization)

- Developed probabilistic forecasting + uncertainty-aware optimization solution: estimate CVaR via dense quantile regression; derive one-step loss from scoring rules; formulate position optimization; achieved average Sharpe 1.33 in leakage-free walk-forward evaluation.
- Links:  code (10 upvotes)  solution (14 upvotes)

“TI Cup” National Undergraduate Electronic Design Competition

Mar 2021 – Nov 2021

 **National 1st Prize** (Digital Signal Processing & Embedded Systems)

- Led DSP-based control algorithm development for three-phase inverter/rectifier: three-/single-phase PLL, PID/PR controllers, dq/ $\alpha\beta$ transforms.
- Links:  DSP tools  PCB/source  demo

Professional Skills

Exploratory Data Analysis

- Data cleaning, preprocessing, feature extraction, visualization, correlation analysis, multicollinearity diagnostics, normality & stationarity tests (Pandas, Polars, Xarray, Numpy)

Machine & Deep Learning

- Model selection, model ensemble, **differentiable optimization in neural networks**, hyperparameter tuning, robust validation (Scikit-learn, XGBoost, LightGBM, RandomForest, Optuna, Pytorch)

Optimization Modeling

- Efficient solving and scalable modeling design for large-scale linear, mixed-integer, stochastic, and distributed optimization problems (CVXPY; LP/MIP/SOCP; solvers: Gurobi/MOSEK/COPT/SCIP)

Version Control & Collaboration

Git-based workflows; team-oriented development

- Collaborative codebase management and reproducible research pipelines (Git, GitHub, GitLab)

Presentations

Enhancing the Export Capability of Renewable Energy Bases through Two-Stage Stability-Constrained Optimal Dispatch	Oct 26, 2025
The 14th International Conference on Renewable Power Generation (RPG 2025), Shanghai, China	
Data-Driven Operation of Seaport Energy-Logistics Systems	Aug 22, 2025
Academic Visiting, University of Liverpool, UK (Invited by Prof. Lin Jiang)	
Data-Driven Operation of Seaport Energy-Logistics Systems	Aug 27, 2025
Academic Visiting, University College London, UK (Invited by Dr. Akylas Stratigakos)	
End-To-End Forecasting for Microgrid Operation using Derivative-Free Learning	Nov 26, 2024
IEEE Sustainable Power and Energy Conference (iSPEC) 2024, Kuching, Malaysia	
Aggregated Probabilistic Forecasting and Stochastic Trading Strategies for HEFTCom2024	Sep 9, 2024
Ørsted Science Talk, Online (Invited by Ørsted Energy)	
Probabilistic Forecasting for Hybrid Power Plants and Stochastic Programming-Based Value-Oriented Trading Strategy (Keynote)	Jun 30, 2024
International Symposium of Forecasting 2024 (ISF 2024), Dijon, France	
Aerodynamic Noise-Based Fault Detection for Wind Turbines: An Unsupervised Approach	May 10, 2024
International Conference on Power Science and Technology (ICPST) 2024, Yunnan, China	
Flexible Coordination of Wind Generators and Energy Storages in Joint Energy and Frequency Regulation Market	Apr 28, 2023
Panda Forum on Power and Energy (PandaFPE), Chengdu, China	

Personal Interests

- Guitar, piano (formerly a band keyboardist) ,Basketball, table tennis, Open source software development (see GitHub)