






# 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

✉ sashabanks@sjtu.edu.cn     LinkedIn  
 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

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- **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

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### 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

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### 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**

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**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**

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