Jie Feng

@ jif005@ucsd.edu | Google Scholar | Portfolio | La Jolla, USA

Education

University of California, San Diego — La Jolla, USA
Ph.D. Candidate in Electrical and Computer Engineering; ***GPA: 3.90/4.00*** — *09/20/2021 – present*
Advisor: *Prof. Yuanyuan Shi*
Research Interest*: Deep Learning, Reinforcement Learning, Optimization, Power Systems, Foundation Models.*

Massachusetts Institute of Technology — Cambridge, USA
Visiting Student — *06/14/2025 – 09/01/2025*

Zhejiang University — Hangzhou, China
Bachelor of Engineering, Automation (Robotics); ***GPA: 3.96/4.00*** — *09/01/2017 – 06/30/2021*
Honors Program*: Mixed Class in Chu Kochen Honor College*

Technical Skills

Languages: Python, Bash.
ML/DL: PyTorch; reinforcement learning (RL); veRL; Ray; SGLang; vLLM; verifiable dataset curation, GNN.
Systems: Linux, Git, Docker.
Power System Simulation: Matpower, Pandapower.

Research Experience

VLM-based GUI-Agent — 09/2025 – Ongoing

- Building a vision–language–model-based agent that operates a computer from natural-language instructions and screenshots, using mouse and keyboard actions.
- Collect agentic training data through parallel rollouts on virtual machines running in Docker.
- Training a reward model to provide rich training signals and help credit assignment to help efficient Multi-turn GRPO-style RL training. Investigating a proper reward model design.

General Vision–Language Reasoning — 12/2024 – 05/2025

AAAI 2026

- Built a visual reasoning dataset designed for RL training, spanning eight reasoning types (infographic, mathematical, spatial, cross-image, and more).
- Developed an influence-function data filtering method to select high-quality cross-domain samples.
- Fine-tuned VLMs using multi-round GRPO-style RL with a difficulty-based data curriculum to improve their visual reasoning capabilities.
- Implemented the full evaluation framework and training data pipelines.

Transformer-based Lyapunov Function Discovery — 02/2024 – 03/2025

International Conference on Machine Learning (ICML) 2025

- Built the first RL-driven framework that uses transformers to generate analytical Lyapunov functions for nonlinear dynamical systems, which is a long-standing open problem in mathematics.
- Designed an optimization-based evaluation module to score candidate functions (rule-based rewards) and trained the model with risk-seeking RL, enabling efficient exploration and candidate evolution.
- Discovered valid Lyapunov functions for systems up to 10 dimensions, including real-world power-system models where no analytical solutions were previously known.

Stability-constrained Power System Control — 09/2021 – present

PSCC, IEEE TPS, IEEE TSG, IEEE TCNS, L-CSS

- Established stability guarantees for voltage and frequency regulation by showing that monotone neural policies satisfy Lyapunov-based stability conditions; designed architectures that enforce this property. Reinforcement Learning is used to improve transient control performance.
- Developed algorithms that provide steady-state guarantees, including a safe gradient-flow method for voltage control and a Neural-PI controller for frequency regulation with fast response and input-to-state robustness.
- Created online adaptation strategies for time-varying systems, using (i) a bandit-based selector among pretrained controllers, and (ii) online policy optimization that updates the neural controller from real-time data.
- Developed a unified control framework for distribution grids that enables learning-based controllers to utilize arbitrary communication infrastructure while ensuring closed-loop stability via ICNN-based architectures.

Publications

Conference Paper

- **Jie Feng**, Yuanyuan Shi, Deepjyoti Deka. *Efficient Policy Adaptation for Voltage Control Under Unknown Topology Changes*, *Power Systems Computation Conference (PSCC)*, 2026.
- Yuheng Zha, Kun Zhou, Yujia Wu, Yushu Wang, Zhi Xu, **Jie Feng**, Shibo Hao, Matthew Ho, Lianhui Qin, Zhengzhong Liu, Eric P. Xing, Zhiting Hu. *Vision-G1: Towards General Reasoning Vision-Language Models via Reinforcement Learning*, *The Association for the Advancement of Artificial Intelligence (AAAI)*, 2026.
- Yuexin Bian, **Jie Feng**, Yuanyuan Shi. *DiffOP: Reinforcement Learning of Optimization-Based Control Policies via Implicit Policy Gradients*, *The Association for the Advancement of Artificial Intelligence (AAAI)*, 2026.
- Haohan Zou*, **Jie Feng***, Hao Zhao, Yuanyuan Shi. *Analytical Lyapunov Function Discovery: An RL-based Generative Approach*, *International Conference on Machine Learning (ICML)*, 2025. Haohan is an undergrad I mentored.

Journal Papers

- Zhenyi Yuan, **Jie Feng**, Yuanyuan Shi, Jorge Cortes. *Stability Constrained Voltage Control in Distribution Grids with Arbitrary Communication Infrastructure*, *IEEE Transactions on Smart Grid (TSG)*, 2025.
- **Jie Feng**, Wenqi Cui, Jorge Cortes, Yuanyuan Shi. Online Event-Triggered Switching for Frequency Control in Power Grids with Variable Inertia, *IEEE Transactions on Power Systems (TPS)*, 2025.
- **Jie Feng**, Manasa Muralidharan, Rodrigo Henriquez-Auba, Patricia Hidalgo-Gonzalez, Yuanyuan Shi. Stability-Constrained Learning for Frequency Regulation in Power Grids With Variable Inertia, *IEEE Control Systems Letters (L-CSS)*, 2024.
- **Jie Feng**, Yuanyuan Shi, Guannan Qu, Steven H. Low, Anima Anandkumar, Adam Wierman. *Stability Constrained Reinforcement Learning for Real-Time Voltage Control in Distribution Systems*, *IEEE Transactions on Control of Network Systems (TCNS)*, 2023.
- **Jie Feng**, Wenqi Cui, Jorge Cortes, Yuanyuan Shi. Bridging Transient and Steady-State Performance in Voltage Control: A Reinforcement Learning Approach with Safe Gradient Flow, *IEEE Control Systems Letters*, 2023.
- Ziheng Duan, Haoyan Xu, Yida Huang, **Jie Feng**, Yueyang Wang. *Multivariate Time Series Forecasting with Transfer Entropy Graph*, *Tsinghua Science and Technology*, 2022
- Haoyan Xu, Ziheng Duan, Yueyang Wang, **Jie Feng**, Runjian Chen, Yida Huang. *Graph Partitioning and Graph Neural Network based Hierarchical Graph Matching for Graph Similarity Computation*, *Neurocomputing*, 2021

Workshop Paper

- **Jie Feng**, Haohan Zou, Yuanyuan Shi. *Combining Neural Networks and Symbolic Regression for Analytical Lyapunov Function Discovery*, *ICML Workshop: Foundations of Reinforcement Learning and Control – Connections and Perspectives*, 2024
- XiangJi Wu, Ziwen Zhang, **Jie Feng**, Lei Zhou, Junmin Wu, *End-to-end Optimized Video Compression with MV-Residual Prediction*, *CVPR Workshop*, 2020

Professional Experience

Los Alamos National Lab — Los Alamos, NM, USA
Student Fellow, Advised by Dr. Deepjyoti Deka — *06/17/2024 – 09/20/2024*

- Designed online policy optimization to adapt pretrained neural policies to time-varying system conditions.

TuCodec AI Lab — Shanghai, China
Research Intern – Video Compression — *01/01/2020 – 06/30/2020*

- CVPR CLIC 2020: 1st place (P-frame) in learning based video compression competition. Built a deep learning based video codec with MV-residual prediction optimized for MS-SSIM.

Selected Awards

LFRP 2024 In-Residence National Laboratory Graduate Fellows (One of the seven awardees selected from all ten University of California campuses) — Dec 2023
Innovation Scholarship for Academic Advances (Chu Kochen College) — Nov 2020
First-class Scholarship for Academic Excellence (Top 3%) — Oct 2020
1st Place, CVPR, Challenge on Learned Image Compression 2020 (P-frame Track) — Jun 2020
Tanglixin Scholarship for Academic Excellence (30/24,878) — Nov 2018

Academic Services

Reviewer L4DC 2026; Automatica, AAAI 2023–2024; IEEE TSG; IEEE TPS; IEEE TEMPR; IEEE T-ITS; IEEE CDC

Teaching Teaching Assistant, ECE 171B – Linear Control System Theory (Fall 2022-Fall 2025)