

# Guanyu Tian

POST DOCTORAL SCHOLAR · SMART INFRASTRUCTURE DATA ANALYTICS LABORATORY

University of Central Florida, 4000 Central Florida Blvd, Orlando, FL, 32816

☎ +1 (518) 428-7611 | ✉ [tiang@knights.ucf.edu](mailto:tiang@knights.ucf.edu) | 🏠 <https://tianguanyu.wixsite.com/guanyu-tian-home-pag>

## Research Interests

---

My research interests lie in the following intertwined areas: 1) Power system **demand response**, 2) Modeling and control of grid-interactive **smart buildings**, 3) Grid-connected **cyber-physical system security**, 4) Modeling and robust optimization of **energy systems** using first-principle and machine-learning hybrid models.

## Highlights

---

- Won the **Best Paper Award** (top 5% of around 1600 papers submitted) as the first author in the IEEE Power & Energy Society General Meeting, 2020.
- Designed and delivered all lectures of an undergraduate course as an **instructor** at the University of Central Florida (Introduction of Randomness to Engineers).
- Published 8 journal papers, 9 conference papers, and 2 patents.

## Academic Appointments

---

### Texas A&M University at Galveston

ASSISTANT PROFESSOR

Galveston, TX

Aug. 2023 - Now

### University of Central Florida

POST-DOCTORAL SCHOLAR & INSTRUCTOR

Orlando, FL

Aug. 2022 - Jul. 2023

## Education

---

### University of Central Florida

PH.D. ELECTRICAL ENGINEERING

Orlando, FL

Jan. 2017 - Aug. 2022

- Advisor: Dr. Qun Zhou Sun
- Dissertation: "Grid-interactive Buildings: Modeling, Operations, and Security"
- M.S. Computer Science (minor)

### Rensselaer Polytechnic Institute

M.S. ELECTRICAL ENGINEERING

Troy, NY

Aug. 2015 - Dec. 2016

- Advisor: Dr. Joe H. Chow
- Dissertation: "Investigations on Solar Power Grid Integration and Simulation"

### Shandong University

B.S. ELECTRICAL ENGINEERING

Jinan, Shandong, China

Sept. 2011 - June 2015

## Industry Experience

---

### National Renewable Energy Laboratory (NREL)

RESEARCH INTERN

Golden, CO

June 2020 - Aug. 2020

- GCxN SPAN/IO project: Modeling and analysis of distribution feeders with DERs in Hawaii.

## Research Experience

---

### **Building Intelligence with Layered Defense using Security-Constrained Optimization and Security Risk Detection (\$3.8M project funded by DoE)**

UCF, Orlando, FL

ADVISOR & PI: DR. QUN ZHOU SUN

Feb. 2019 - Now

- Grid-interactive HVAC system **cyber-attack** and the defense strategies.
- HVAC system power **flexibility quantification** and optimal response strategies to grid signals.
- HVAC system first-principle **model convexification** using semidefinite programming (SDP).
- Distributionally robust optimization (DRO) and chance-constrained DRO of HVAC day-ahead scheduling.
- Logistic Regression Markov Chain (LRMC) model for HVAC power consumption prediction.
- Coordination of commercial building HVAC scheduling for peak load and operation cost reduction.

### **Machine Learning-aided Power System State Estimation**

UCF, Orlando, FL

ADVISOR: DR. QUN ZHOU SUN

Jan. 2017 - Jan. 2019

- Neural network-based hybrid-learning algorithm for power system dynamic and static state estimation.
- Convolutional neural network (CNN)-based data-driven fault location identifier for distribution power systems.

### **Power System Solar PV Integration**

RPI, Troy, NY

ADVISOR: DR. JOE H. CHOW

Aug. 2015 - Dec. 2016

- Simulations of solar power integration and investigated the optimal siting strategies of solar plants considering system congestion and generation cost

## Awards

---

- UCF Preeminent Postdoctoral Program (P3) award, 2023.
- UCF Graduate Fellowship of Doctoral Research Support Award, 2021.
- Power&Energy Society General Meeting Best Paper Award, 2020.
- National Science Foundation (NSF) Student Travel Grant, 2020.

## Selected Publications

---

### [PRE-PRINT]

1. **G. Tian**, Y. Qiao, Q. Z. Sun, "Sensor Attacks and Resilient Defense on HVAC Systems for Energy Market Signal Tracking," to be submitted.

### [JOURNAL PAPERS]

9. **G. Tian**, Q. Z. Sun, "A Stochastic Controller for Primary Frequency Regulation using ON/OFF Demand Side Resources," *IEEE Transactions on Smart Grid*, 2023.
8. W. Wang, **G. Tian**, Q. Z. Sun, et al., "A Control Framework to Enable a Commercial Building HVAC System for Energy and Regulation Market Signal Tracking," *IEEE Transactions on Power Systems*, 2022.
7. S. Faddel, Q. Z. Sun, **G. Tian**, "Modeling and Coordination of Commercial Buildings in Distribution Systems," *IEEE Transactions on Industry Applications*, 2022.
6. **G. Tian**, Q. Z. Sun, W. Wang, "Real-time Flexibility Quantification of a Building HVAC System for Peak Demand Reduction," *IEEE Transactions on Power Systems*, 2021.
5. **G. Tian**, Y. Gu, D. Shi, et al., "Enhanced Denoising Autoencoder Aided Bad Data Filtering for Synchrophasor-based State Estimation," *CSEE Journal of Power and Energy Systems*, 2021.
4. W. Wang, Q. Zhou, **G. Tian**, et al., "A novel defrosting initiation strategy based on convolutional neural network for air-source heat pump," *International Journal of Refrigeration*, 2021.
3. S. Faddel, **G. Tian**, Q. Zhou, "Decentralized management of commercial HVAC systems," *Energies*, 2021.

2. **G. Tian**, Y. Gu, D. Shi, et al., “Neural Network-based Power System State Estimation with Extended Observability,” *Journal of Modern Power System and Clean Energy (MPCE)*, 2021.
1. **G. Tian**, Q. Zhou, R. Birari, et al., “A Hybrid-learning algorithm for online dynamic state estimation in multi-machine power systems,” *IEEE Transactions on Neural Network and Learning Systems*, 2020.

[CONFERENCE PROCEEDINGS]

9. **G. Tian**, Q. Zhou, “Optimal HVAC Scheduling under Temperature Uncertainty using the Wasserstein Metric”, *IEEE Power&Energy Society General Meeting (PESGM)*, 2022.
8. **G. Tian**, Q. Zhou, “Chance Constrained Distributionally Robust Optimal HVAC Scheduling for Commercial Building Demand Response”, *IEEE PES Innovative Smart Grid Technologies (ISGT)*, 2022.
7. S. Faddel, **G. Tian**, Q. Zhou, “Privacy-based coordination of commercial buildings in distribution systems”, *IEEE Industry Applications Society Annual Meeting (IAS)*, 2021.
6. S. Faddel, **G. Tian**, Q. Zhou, et al., “On the Performance of Data-Driven Reinforcement Learning for Commercial HVAC Control”, *IEEE Industry Applications Society Annual Meeting (IAS)*, 2020.
5. **G. Tian**, S. Faddel, X. Jin, et al., “Probabilistic Power Consumption Modeling for Commercial Buildings Using Logistic Regression Markov Chain”, *IEEE Power&Energy Society General Meeting (PESGM)*, 2020. (Best Paper Award)
4. **G. Tian**, Y. Gu, D. Shi, et al., “Estimation Matrix Calibration of PMU Data-driven State Estimation Using Neural Network”, *IEEE Power&Energy Society General Meeting (PESGM)*, 2020.
3. S. Faddel, **G. Tian**, Q. Zhou, et al., “Data Driven Q-Learning for Commercial HVAC Control”, *IEEE Southeast-Con*, 2020.
2. **G. Tian**, S. Faddel, Q. Zhou, et al., “Optimal Coordination of HVAC Scheduling for Commercial Buildings”, *IEEE Texas Power and Energy Conference (TPEC)*, 2020.
1. **G. Tian**, Q. Zhou, and L. Du, “Deep Convolutional Neural Networks for Distribution System Fault Classification,” *IEEE Power&Energy Society General Meeting (PESGM)*, 2018.

[PATENTS]

2. Y. Gu, **G. Tian**, C. Xu, et al. “Systems and methods of power system state estimation.” U.S. Patent 11,320,492, issued May 3, 2022.
1. Y. Gu, **G. Tian**, C. Xu, et al. “Systems and methods of bad data identification and recovery for electric power systems.” U.S. Patent Application 17/091,792, filed May 13, 2021.

Teaching Experience

---

- Fall 2022 **EEL 3021 Introduction of Randomness to Engineers**, Instructor
- Spring 2019 **EEL 4216: Fundamentals of Electric Power Systems**, Teaching Assistant
- Fall 2018 **EEL 4216: Fundamentals of Electric Power Systems**, Teaching Assistant
- Spring 2017 **EEL 4216: Fundamentals of Electric Power Systems**, Teaching Assistant

## Training Experience

---

### **Preparing Tomorrow's Faculty Program**

*UCF, Orlando, FL  
Aug. 2022 - Dec. 2022*

- Pedagogy theories and practice about teaching undergraduate-level courses.
- Training on teaching and communication skills.
- Certificate of completion of the PTF program.

## Academic Services

---

- Reviewer, *IEEE Transactions on Smart Grid*
- Reviewer, *IEEE Transactions on Transportation Electrification*
- Reviewer, *IEEE Transactions on Industrial Informatics*
- Reviewer, *IEEE Access*
- Reviewer, *Journal of Modern Power Systems and Clean Energy*

## Invited Talks

---

### **Spring Technical Conference of IEEE PES Orlando Chapter**

*Orlando Utilities Commission,  
Orlando, FL  
April 4th 2023*

**DEMAND RESPONSE AND CYBERSECURITY OF GRID-INTERACTIVE BUILDINGS**