Bendong Tan

PhD Candidate

Department of Electrical and Computer Engineering

University of Connecticut

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EDUCATION

- **University of Connecticut (Ph.D. candidate in Electrical Engineering)**　　Jan. 2022 – Now
  - **Grade Point Average (GPA):** 4.00/4.00
  - **Research area:** Uncertainty quantification for power system identification, monitoring and stability
  - **Supervisor:** Prof. Junbo Zhao

- **Mississippi State University (Ph.D. student in Electrical Engineering)**　　Aug. 2021 – Dec. 2021
  - **Research area:** Low-inertia power system identification, monitoring and control
  - **Supervisor:** Prof. Junbo Zhao

- **Wuhan University (M.S. in Electrical Engineering)**　　Sept. 2017 – May 2020
  - **Thesis:** Power System Transient Stability Assessment with Unsatisfactory Data
  - **Supervisor:** Prof. Yuanzhang Sun & Prof. Jun Yang

- **Wuhan University (B.E. in Electrical Engineering)**　　Sept. 2013 – July 2017
  - **Grade Point Average (GPA):** 3.60/4.00
  - **Ranking:** 22/379 (**top 6%**)
  - **Thesis:** Transient Stability Assessment of Power System Based on Data Mining Technology
  - **Supervisor:** Prof. Jun Yang

WORK EXPERIENCE

- **Teaching Assistant: University of Connecticut, USA**　　Sept. 2023 –Dec. 2023
  - Responsible for teaching usage of PSS/E, and grading assignments and exams.

- **Internship: National Renewable Energy Laboratory, USA**　　May 2023 – Aug. 2023
  - Responsible for developing online regional inertia monitoring techniques for WECC power system.

RESEARCH INTERESTS

Power system dynamics, stability control, estimation, machine learning, renewable energy integration, risk assessment, uncertainty quantification and management.

PUBLICATIONS (Google Scholar)

- **Journal Paper**

  [J1] **Bendong Tan**, Junbo Zhao, "Data-driven adaptive unscented Kalman filter for time-varying inertia and damping estimation of utility-scale IBRs considering current limiter," ***IEEE Transactions on Power Systems***, 2024, doi: 10.1109/TPWRS.2024.3379956.

  [J2] Jiahao Liu, Cheng Wang, Junbo Zhao, **Bendong Tan** and Tianshu Bi, "Simplified transient model of DFIG wind turbine for power system frequency dynamics analysis," ***IEEE Transactions on Power Systems***, vol. 39, no. 2, pp. 3752-3768, Mar. 2024.

  [J3] **Bendong Tan**, Junbo Zhao, "Debiased uncertainty quantification approach for probabilistic transient stability assessment," ***IEEE Transactions on Power Systems***, vol. 38, no. 5, pp. 4954-4957, Sept. 2023.

[J4] **Bendong Tan**, Junbo Zhao and Nan Duan, "Amortized Bayesian parameter estimation approach for WECC composite load model," *IEEE Transactions on Power Systems*, vol. 39, no. 1, pp. 1517-1529, Jan. 2024.

[J5] Guozhou Zhang, Junbo Zhao, Weihao Hu, Di Cao, **Bendong Tan**, Qi Huang and Zhe Chen, "A novel data-driven self-tuning SVC additional fractional-order sliding mode controller for voltage stability with wind generations," *IEEE Transactions on Power Systems*, vol. 38, no. 6, pp. 5755-5767, Nov. 2023.

[J6] **Bendong Tan**, Junbo Zhao and Le Xie., "Transferable deep kernel emulator for probabilistic load margin assessment with topology changes, uncertain renewable generations and loads," *IEEE Transactions on Power Systems*, vol. 38, no. 6, pp. 5740-5754, Nov. 2023.

[J7] **Bendong Tan**, Junbo Zhao, "Data-driven time-varying inertia estimation of inverter-based resources," *IEEE Transactions on Power Systems*, vol. 38, no. 5, pp. 4954-4957, Sept. 2023.

[J8] Maolin Zhu, Hao Liu, Junbo Zhao, **Bendong Tan**, Tianshu Bi and Samson Shenglong Yu, "Dynamic state estimation for DFIG with unknown inputs based on cubature Kalman filter and adaptive interpolation," *Journal of Modern Power Systems and Clean Energy*, vol. 11, no. 4, pp. 1086-1099, July 2023.

[J9] **Bendong Tan**, Junbo Zhao and Marcos Netto, "A general decentralized dynamic state estimation with synchronous generator magnetic saturation," *IEEE Transactions on Power Systems*, vol. 38, no. 1, pp. 960-963, Jan. 2023.

[J10] **Bendong Tan**, Junbo Zhao, Nan Duan, Daniel Adrian Maldonado, Yingchen Zhang, Hongming Zhang and Mihai Anitescu, "Distributed frequency divider for power system bus frequency online estimation considering virtual inertia from DFIGs," *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, vol. 12, no. 1, pp. 161-171, 2022.

[J11] **Bendong Tan**, Junbo Zhao, Vladimir Terzija and Yingchen Zhang, "Decentralized data-driven estimation of generator rotor speed and inertia constant based on adaptive unscented Kalman filter," *International Journal of Electrical Power & Energy Systems*, vol.137, pp.107853, 2022.

[J12] **Bendong Tan**, Junbo Zhao, Marcos Netto, Venkat Krishnan, Vladimir Terzija and Yingchen Zhang, "Power system inertia estimation: Review of methods and the impacts of converter-interfaced generations," *International Journal of Electrical Power & Energy Systems*, vol.134, pp.107362, 2022. (Best paper award)

[J13] Seyyed Rashid Khazeiynasab, Junbo Zhao, Issa Batarseh and **Bendong Tan**, "Power plant model parameter calibration using conditional variational autoencoder," *IEEE Transactions on Power Systems*, vol. 37, no. 2, pp. 1642-1652, 2022.

[J14] Juelin Liu, Zhifang Yang, Junbo Zhao, Juan Yu, **Bendong Tan** and Wenyuan Li, "Explicit data-driven small-signal stability constrained optimal power flow," *IEEE Transactions on Power Systems*, vol. 37, no. 5, pp. 3726-3737, Sept. 2022.

[J15] **Bendong Tan**, Jun Yang, Ting Zhou, Xiangpeng Zhan, Yuan Liu, Shengbo Jiang and Chao Luo, "Spatial-temporal adaptive transient stability assessment for power system under missing data," *International Journal of Electrical Power & Energy Systems*, vol.123, pp.106237, 2020.

[J16] **Bendong Tan**, Jun Yang, Yufei Tang, Shengbo Jiang, Peiyuan Xie, Wen Yuan, "A deep imbalanced learning framework for transient stability assessment of power system," *IEEE Access*, vol.7, pp.81759-81769, 2019.

- **Conference Paper**

[C1] Ketian Ye, Junbo Zhao, Mingguo Hong, Slava Maslennikov, **Bendong Tan** and Xiaochuan Luo, "Power system overloading risk assessment considering topology and renewable uncertainties," in *2024 IEEE Power & Energy Society General Meeting (PESGM)*, 2024, **Accepted**. (Best paper award)

[C2] **Bendong Tan**, Jiangkai Peng, Ningchao Gao, Junbo Zhao and Jin Tan, "Comparative study of data-driven area inertia estimation approaches on WECC power systems," in *2024 IEEE Power & Energy Society General Meeting (PESGM)*, 2024, **Accepted**.

[C3] **Bendong Tan**, Junbo Zhao, Daniel Adrian Maldonado and Jason Philhower, "Time-varying inertia estimation for inverter-based resources," in ***2023 IEEE Power & Energy Society General Meeting (PESGM)***, pp. 1-5, 2023.

[C4] **Bendong Tan**, Junbo Zhao, Tong Su, Qiuhua Huang, Yingchen Zhang and Hongming Zhang "Explainable Bayesian neural network for probabilistic transient stability analysis considering wind energy,", in ***2022 IEEE Power & Energy Society General Meeting (PESGM)***, pp. 1-5, 2022. (Best paper award)

[C5] **Bendong Tan**, Junbo Zhao, Weijia Liu and Nan Duan, "Interpretable data-driven probabilistic power system load margin assessment with uncertain renewable energy and loads,", in ***11th International Conference on Innovative Smart Grid Technologies (Asia)***, 2022. (Best paper award)

[C6] **Bendong Tan**, Junbo Zhao, Federico Milano, Qiupin Lai, Yingchen Zhang and Daniel Adrian Maldonado, "Extended frequency divider for bus frequency estimation considering virtual inertia from DFIGs," in ***2021 IEEE PES Innovative Smart Grid Technologies Conference - Latin America (ISGT Latin America)***, pp. 1-5, 2021.

[C7] **Bendong Tan**, Jun Yang, Ting Zhou, Yi Xiao and Qiangming Zhou, "A novel temporal feature selection for time-adaptive transient stability assessment," in ***2019 IEEE PES Innovative Smart Grid Technologies Europe (ISGT-Europe)***, pp. 1-5, 2019.

[C8] **Bendong Tan**, Jun Yang, Xueli Pan, Jun Li, Peiyuan Xie and Ciling Zeng, "Representational learning approach for power system transient stability assessment based on convolutional neural network," in ***The 6th Renewable Power Generation Conference***, Sep. 2017.

[C9] Bi Liu, Junbo Zhao, Qi Huang, Federico Milano, **Bendong Tan** and Weihao Hu, "Robust nonlinear controller for wind turbine generator drivetrain torsional oscillation under large disturbances," in ***2021 IEEE Power & Energy Society General Meeting (PESGM)***, Washington, DC, USA, pp. 1-5, 2021. (Best paper award)

- **In Progress Paper**

[J1] **Bendong Tan**, Junbo Zhao and Yousu Chen, "Scalable risk assessment of rare events in power systems with uncertain wind generation and loads," ***IEEE Transactions on Power Systems***, 2024. (**Under the second round of review**)

[J2] **Bendong Tan**, Junbo Zhao, "Bayesian post-fault power system dynamic trajectory prediction," ***IEEE Transactions on Power Systems***, 2024. (**Under review**)

[J3] **Bendong Tan**, Junbo Zhao, Naiyuan Chiang and Nan Duan, "High-dimension Bayesian parameter estimation for WECC composite load model using realistic event measurements," ***IEEE Transactions on Power Systems***, 2024. (**Under review**)

[J4] Ankur Srivastava, **Bendong Tan** and Junbo Zhao, "A communication-free transmission line protection scheme leveraging dynamic state estimation with inverter-based resources," ***IEEE Power Engineering Letters***, 2024. (**Under review**)

[J5] Xingyu Zhao, **Bendong Tan** and Junbo Zhao, "Power system dynamic state estimation of grid-forming inverters with current limiter," ***IEEE Power Engineering Letters***, 2024. (**Under review**)

[J6] Tong Su, Junbo Zhao, **Bendong Tan**, Daniel Maldonado, Xiaodong. Liu, and Xiaochuan Luo, "Analytic input convex neural networks enabled transient stability predictive control with wind generators," ***IEEE Transactions on Power Systems***, 2024. (**Under review**)

AWARDS

- **2024 Summer Pre-Doctoral Fellowship** May 2024
  Awarded by the Department of Electrical and Computer Engineering, University of Connecticut

- **2024 Summer Doctoral Dissertation Fellowship** Apr. 2024
  Awarded by the University of Connecticut

- **2023 Excellent Reviewer Award**   Jan. 2024
  Awarded by Journal of Modern Power Systems and Clean Energy Editorial Broad
- **2023 IEEE PES Connecticut Chapter Outstanding Young Engineer Award**   Jan. 2024
  Awarded by Connecticut Power and Energy Chapter
- **IEEE Transactions on Power Systems Oustanding Reviewer**   Dec. 2023
  Awarded by the IEEE Transactions on Power Systems Editorial Broad
- **Conference Participation Award**   July 2023
  Awarded by the University of Connecticut
- **GE Fellowship for Excellence**   May 2023
  Awarded by the University of Connecticut
- **IEEE Transactions on Power Systems Oustanding Reviewer**   Mar. 2023
  Awarded by the IEEE Transactions on Power Systems Editorial Broad
- **Best Conference Paper Award**   Aug. 2022
  Awarded by IEEE Conference on Innovative Smart Grid Technologies - Asia (ISGT Asia) for the paper "Interpretable data-driven probabilistic power system load margin assessment with uncertain renewable energy and load"
- **Best Conference Paper Award**   July 2022
  Awarded by IEEE Power and Engineering Society General Meeting for the paper "Explainable Bayesian neural network for probabilistic transient stability analysis considering wind energy"
- **Best Journal Paper Award**   June 2022
  Awarded by the International Journal of Electrical Power & Energy Systems for the paper "Power system inertia estimation: Review of methods and the impacts of converter-interfaced generations"
- **IEEE Transactions on Power Systems Oustanding Reviewer**   Jan. 2022
  Awarded by the IEEE Transactions on Power Systems Editorial Broad
- **Power Exploration Scholarship(top 1%)**   Sept. 2019
  Awarded by Wuhan University
- **First-class Undergraduate Scholarship of Wuhan University(top 5%)**   Sept. 2016
  Awarded by Wuhan University
- **First-class Undergraduate Scholarship of Wuhan University(top 5%)**   Sept. 2015
  Awarded by Wuhan University

SKILLS

- **Power System Softwares**
  - Skilled with with **DIgSILENT simulation language** for converter-interfaced generation modeling;
  - Proficient in using **PSS/E, PowerWorld** for dynamic power system simulation;
  - Experienced in **PST, PSAT, PSASP, PSD-BPA** for dynamic power system simulation.

- **Programming Languages** – Proficient in using Python and Matlab; Experienced in C, Julia.

PROJECTS

- **Probabilistic Power System Risk Assessment with Uncertain Renewable Generations and Loads**
  ISO New England   Dec. 2022 – Nov. 2023
  Major contribution
  - Expedited assessment of the risk of the ISO New England power system under massive contingencies;
  - Fast risk assessment of forced outages through transfer learning.

- **Load Sculptor: Robust Dynamic Load Modeling and Uncertainty Quantification**
  US Department of Energy and Lawrence Livermore National Laboratory   June 2020 – Dec. 2023
  Major contribution
  - Filter out invalid simulations due to the unsuitable parameter combinations;
  - Global sensitivity analysis is developed to identify the sensitivity of each parameter;
  - Bayesian parameter estimation for the composite load model with distributed generation (CMPLDWG).

- **Modeling and Analytics for WI Near Term Resilience and Reliability**
  US Department of Energy and National Renewable Energy Laboratory　　　　Mar. 2021– Apr. 2022
  Major contribution
    - Uncertainty quantification from uncertain sources, i.e., wind generations and loads, to load margin;
    - Transfer learning-enabled model updating under topology changes.

- **Macro-Resiliency of the North American Power Grid**
  US Department of Energy and Argonne National Laboratory　　　　June 2020 – Dec. 2023
  Major contribution
    - Track the time-varying inertia in inverter-based resources (IBRs) with grid-forming control;
    - Effects from the current limiter are mitigated during inertia tracking.

TALKS

[T1] June 2024, "Data-driven uncertainty quantification for stochastic power system: risk assessment and parameter estimation", *The Young Scholars Forum of the School of Electrical Engineering, Chongqing University*, Chengdu, Chongqing, China. (**Virtual**)

[T2] May 2024, "Data-driven uncertainty quantification for stochastic power system: parameter estimation, risk and stability assessment", *Process-Energy-Environmental Systems Engineering (PEESE) Lab of Cornell University*, Ithaca, NY, USA. (**Virtual**)

[T3] Mar. 2024, "Power grid time-varying inertia estimation with inverter-based resources", *2024 G-PST Future of Inertia Summit*, USA. (**Virtual**)

[T4] Dec. 2023, "High-dimension Bayesian parameter estimation approach for WECC composite load model", *2023 Yuelu Forum of Hunan University*, Changsha, Hunan, China.

[T5] Sept. 2023, "Amortized Bayesian parameter estimation approach for WECC composite load model", *2023 UCONN Power/Electronics Joint Seminar*, Srorrs, CT, USA.

[T6] July 2023, "Time-varying inertia estimation for inverter-based resources", *IEEE Power & Energy Society General Meeting (PESGM)*, Orlando, FL, USA.

[T7] Nov. 2022, "Interpretable data-driven probabilistic power system load margin assessment with uncertain renewable energy and loads", *11th International Conference on Innovative Smart Grid Technologies (Asia)*, Online.

[T8] July 2022, "Time-varying inertia estimation for inverter-based resources", *IEEE Power & Energy Society General Meeting (PESGM)*, Denvor, CO, USA.

[T9] Sept. 2021, "Extended frequency divider for bus frequency estimation considering virtual inertia from DFIGs", *IEEE PES Innovative Smart Grid Technologies Conference - Latin America (ISGT Latin America)*, Online.

[T10] Sept. 2019, "A novel temporal feature selection for time-adaptive transient stability assessment", *IEEE PES Innovative Smart Grid Technologies Europe (ISGT-Europe)*, Online.

[T11] Oct. 2017, "Representational learning approach for power system transient stability assessment based on convolutional neural network", *The 6th Renewable Power Generation Conference*, Wuhan, Hubei, China.

SERVICES

- **Peer Reviewer**
    - IEEE Transactions on Power Systems
    - IEEE Transactions on Smart Grid
    - IEEE Power Engineering Letters
    - IEEE Open Access Journal of Power and Energy
    - International Journal of Electrical Power & Energy Systems
    - CSEE Journal of Power and Energy Systems
    - IET Generation, Transmission & Distribution
    - Journal of Modern Power Systems and Clean Energy
    - IEEE Transactions on Circuits and Systems II: Express Briefs

- Electric Power Systems Research
- IEEE ACCESS
- IET Smart Grid
- IET Renewable Power Generation
- Applied Energy
- IEEE Transactions on Neural Networks and Learning Systems
- IEEE Transactions on Cybernetics