Xinyi Zhao

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EDUCATION BACKGROUND

Tsinghua University — **Shenzhen, China**
M.S., Electrical Engineering, Tsinghua-Berkeley Shenzhen Institute (TBSI) — *Sept. 2018-Now*
GPA: 3.98/4.0 (Rank 1/128); Co-advised by: Prof. Hongbin Sun and Dr. Xinwei Shen

Wuhan University — **Wuhan, China**
B.Eng., Electrical Engineering, Department of Electrical Engineering and Automation — *Sept. 2014-Jun. 2018*
GPA: 3.87/4.0 (Rank 4/340);

PUBLICATIONS

♢ **Journals:**

- **Xinyi Zhao**, Xinwei Shen, Qinglai Guo, Hongbin Sun and Shmuel S. Oren. *A Stochastic Distribution System Planning Method Considering Regulation Services and Energy Storage Degradation.* **Applied Energy**, 2020, 277:115520. [PDF]
- Zhiyong Yuan, Yiqi Zhao, Zuogang Guo, Xiyuan Ma, Jinyong Lei, **Xinyi Zhao**, *et al*. *Research Summary of Integrated Energy Systems Planning for Energy Internet.* **Southern Power System Technology**, 2019, 7:1-9.

♢ **Conferences:**

- **Xinyi Zhao**, Xinwei Shen, Hongkun Chen, *et al*. *A Two-Stage Multi-Objective Planning Strategy for Electric Vehicle Charging Stations Considering Power-loss Sensitivity in Distribution System.* **2nd IEEE Conference on Energy Internet and Energy System Integration**, 2018. [PDF]
- **Xinyi Zhao**, Xinwei Shen, Tian Xia, *et al*. *Optimal Distribution System Planning Considering Regulation Services and Degradation of ESSs.* **11th International Conference on Applied Energy**, 2019. [PDF]
- Yuquan Liu, **Xinyi Zhao**, Xinwei Shen, *et al*. *A Distribution System Expansion Planning Method Considering Integrated Energy Service Providers' Revenue on Energy Storage Investment.* **25th International Conference on Electricity Distribution**, 2019. [PDF]

♢ **Patent:**

- **Xinyi Zhao**, Linxin Yin, Shinan Song, Huiyi Hu, Zhi Zhang and Yu Zheng. *Human Body Knee Jerk Intelligent Diagnosis and Treatment Percussion Hammer based on Six-axis Acceleration Transducer.* (**No: 201710279460.6, Invention Granted**), 2017. [Abstract]

RESEARCH EXPERIENCE

Smart Grid and Renewable Energy Laboratory — **Shenzhen, China**
Distribution System Planning Considering Regulation Services and ESS Degradation — *Sept. 2018-Now*

♢ **Degradation model of storage units in distribution system planning**

- Added a linear degradation penalty term in the objective to avoid excessive charge/discharge of ESSs;
- Compared degradation curves of ESSs in different cases, and identified that the storage lifetime was prolonged for one year when considering degradation penalty.

♢ **Gaussian mixture model to generate stochastic scenarios**

- Adopted GMM to model distributions of load demand, LMP, regulation signals and prices accurately to generate diverse stochastic scenarios.

♢ **Modified progressive hedging algorithm**

- Proved that a rational average solution is superior to the traditional mathematical expectation ($\sum_{s\in S}\theta_s \cdot X_s$) on stable convergence when implementing *non-anticipativity* constraints;
- With parallel computing and gap-dependent penalty factors, the modified progressive hedging outperformed Gurobi and the L-shaped method.

Smart Grid and Renewable Energy Laboratory **Shenzhen, China**
Distribution System Expansion Planning Considering IESPs' Revenue on ESSs *Jan. 2019-Jul. 2019*

♢ **Cost contribution arrangement on ESSs between the utility and integrated energy service providers**
- Helped Guangzhou Power Grid Corp. determine an investment proportion of ESSs to attract IESPs, which was published in CIRED 2019. [Poster]

♢ **Benders decomposition in the planning problem**
- Solved the planning problem within acceptable time, and improved the computation efficiency by 2–6 times compared with the Branch & Bound method.

Power System Research Center in WHU **Wuhan, China**
Multi-objective Planning for Large-scale EVs Considering Power-loss Sensitivity *Feb. 2018-Jun. 2019*

♢ **Power-loss sensitivity index to identify candidate sites of electric vehicle charging stations**
- Based on power flow equations in polar coordinates, a sensitivity index which is the derivative of the total power loss with respect to node voltage is established;
- Located charging stations at nodes with largest sensitivity indices, to reduce the energy losses of the whole system as much as possible.

♢ **Multi-objective sizing problem**
- Maximized the utility income as well as minimized the overall cost for charging stations;
- Employed NSGA-II to obtain the Pareto solution set, and adopted fuzzy clustering to select the optimal solution from the Pareto set.

AWARDS

Graduate study:
- Tsinghua Comprehensive Scholarship (3/84) *Sept. 2019*

Undergraduate study:
- First Prize in the 10th National University Students Electrical Math Modeling Competition *Aug. 2017*
- First Power Exploration Scholarship of Wuhan University (3/340) *Sept. 2016*
- China National Scholarship (Top 0.2% of all undergraduate students in China) *Nov. 2015*
- First-class Student Scholarship & Merit Student Scholarship of Wuhan University *Nov. 2015*
- Merit Freshmen Scholarship of Wuhan University (Top 5% of students enrolled in WHU) *Dec. 2014*

TEACHING

- TA, Reinforcement Learning for Energy Systems (16 hrs), Prof. Scott Moura *Summer, 2020*
- TA, Introduction of Smart Grid (32 hrs), Prof. Ye Guo and Prof. Yinliang Xu *Spring, 2020*
- TA, Energy-Environment and Data-Information 100 level (16 hrs), Prof. Xuan Zhang *Fall, 2019*

INVITED PRESENTATION

- Conference oral presentation: *Optimal Distribution System Planning Considering Regulation Services and Degradation of Energy Storage Systems.* **ICAE 2019**, Västerås, Sweden, selected for further considerations in **Applied Energy** (Top 5%). [PPT]

SKILLS & CERTIFICATION

- Skills: Matlab (Proficient with YALMIP toolbox), Visio (Proficient), Multisim, Word/Excel/PPT, LaTex;
- Certification: China National Computer Rank Examination Level 2 (C Language Programming: 90+ /100).