WENQI CUI

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EDUCATION

University of Washington, Seattle, WA *Sept.2019 - Present*
Ph.D. Student in Electrical and Computer Engineering
Relevant coursework: Reinforcement Learning, Machine Learning, Convex Optimization, Statistical Inference

Zhejiang University, Hangzhou, P.R. China *Sept. 2016 - Jun. 2019*
Master of Science in Electrical Engineering   Ranking:1/58

Southeast University, Nanjing, P.R. China *Sept. 2012 - Jun. 2016*
Bachelor of Engineering in Electrical Engineering and Automation   Ranking:1/163

PUBLICATIONS

[1]. **Wenqi Cui** and Baosen Zhang, "Lyapunov-Regularized Reinforcement Learning for Power System Transient Stability ", 2021; *arXiv preprint*: 2103.03869.

[2]. **Wenqi Cui** and Baosen Zhang, "Reinforcement Learning for Optimal Frequency Control: A Lyapunov Approach", 2020; *arXiv preprint*: 2009.05654.

[3]. **Wenqi Cui**, Yi Ding *et al.*, "Evaluation and Sequential-Dispatch of Operating Reserve Provided by Air Conditioners Considering Lead-Lag Rebound Effect", *IEEE Trans. Power Syst.* 2018; 33(6):6935-6950.

[4]. **Wenqi Cui**, Yi Ding *et al.*, "Two-Stage Payback Model for the Assessment of Curtailment Services Provided by Air Conditioners", *Energy Procedia* 2017;142:2050–2056.

[5]. Yi Ding, **Wenqi Cui** *et al.*, "Multi-State Operating Reserve Model of Aggregate Thermostatically-Controlled-Loads for Power System Short-Term Reliability Evaluation",*Applied Energy* 2019;241:46-58.

[6]. Zhoubin Liu, **Wenqi Cui** *et al.*, "Design of Capacity Incentive and Energy Compensation for Demand Response Programs", *IOP Conf. Ser. Earth Environ. Sci.* 2018; 121(5):52059.

RESEARCH EXPERIENCE

Lyapunov-Regularized RL for Power System Transient Stability   Jan. 2021 - May. 2021

- Proposed a Lyapunov regularized RL approach for optimal frequency control for transient stability in lossy networks
- Learned a neural Lyapunov function where the losses are specially designed with respect to the physical power system. We enhance training performance by active learning.
- The learned neural Lyapunov function is then utilized as a regularization to train the neural network controller by penalizing actions that violate the Lyapunov conditions.

A Lyapunov Approach for Safe Reinforcement Learning   Apr. 2020 - Dec. 2020

- Derived structure property of stablizing neural network controllers according to Lyapunov condition in power system frequency control problem
- Proposed a stacked-ReLU neural network controller to construct a monotonic increasing function through the origin, which implicitly guarantee exponential stability for all system parameter and topologies

RNN Framework for Efficient Training in Sequential Decision Making   Oct. 2019 - May. 2020

- Integrated neural network controller and state transition dynamics in recurrent neural network (RNN) to implicitly satisfy inequality and equality constraints in optimization

- The proposed RNN based framework realize efficient update of neural network variables with time-coupled state dynamics and decision making in frequency control problem

Optimization and Control for Power Systems Operation   Sept. 2016 - Dec. 2019

- Proposed an optimal sequential dispatch strategy of demand side resources to mitigate the harmful payback effect to the power system
- Improved the reliability of demand side resources for the provision of ancillary services, e.g., frequency regulation, spinning reserve, non-spinning reserve
- Implemented a coupon-based pilot demand response policy in residential areas with approximately 110,000 residential customers in Changzhou and Suzhou

TALKS AND PRESENTATIONS

[1]. "Two-Stage Payback Model for the Assessment of Curtailment Services Provided by Air Conditioners", *the 9th International Conference on Applied Energy*, Cardiff, UK, Aug. 2017.

[2]. "Design of Capacity Incentive and Energy Compensation for Demand Response Programs",*the 2nd International Conference on Energy Engineering and Environmental Protection* , Sanya, China, Dec. 2017.

HONORS & AWARDS

Sept. 2020	Clean Energy Institute (CEI) Fellowship, University of Washington
Sept. 2019	Rushmer Innovator Fellowship, University of Washington
Mar. 2019	Excellent Postgraduate Students' Award, Department of Education of Zhejiang Province
Oct. 2018	National Scholarship, Chinese Ministry of Education (top 3%)
Oct. 2018	Graduate of Merit, Zhejiang University (top 10%)
Jun. 2016	Outstanding Graduate Award, Southeast University (top 5%)
Oct. 2015	Chancellor Scholarship, Southeast University (top 1%)
Nov. 2014	Pacemaker to Merit Student, Southeast University (top 1%)
Oct. 2014	National Scholarship, Chinese Ministry of Education (top 3%)
Aug. 2014	Third Prize in 2014 National University Student Social Practice and Science Contest on Energy Saving & Emission Reduction, Chinese Ministry of Education

SERVICES & ACTIVITIES

Oct. 2020 - Present	Participant in Clean Energy Institute K-12 Outreach program
Nov. 2018 - Present	Reviewer for IEEE Transactions on Power Systems; IEEE Transactions on Smart Grid; Applied Energy
Oct. 2016 - Oct. 2017	Deputy Director of Academic Department in Graduate Union, Zhejiang University
Sept. 2013 - Sept. 2014	Deputy Director of Academic Department in Student Union, Southeast University