

# Duehee Lee

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## EDUCATION

*Ph.D.*, Electrical and Computer Engineering (Advisor: Dr. Ross Baldick) Jan 2010 - May 2015  
University of Texas at Austin, Austin, TX GPA 3.62 / 4.0

**THESIS : Wind Power Forecasting and Its Application to Power System**

*M.S.E.*, Electrical and Computer Engineering (Advisor: Dr. Surya Santoso) Sep 2007 - Dec 2009  
University of Texas at Austin, Austin, TX GPA 3.70 / 4.0

**THESIS : Design and Implementation of Three Phase Inverters using the TMS320F2812 DSP**

*Bachelor of Science*, Electrical and Computer Engineering Mar 2000 - Feb 2004  
Pohang University of Science and Technology, Pohang, Republic of Korea GPA 3.45 / 4.3

Daegu Science High School, Daegu, Republic of Korea Mar 1997 - Feb 2000

## PROFESSIONAL EXPERIENCE

**KonKuk University**, Seoul, Republic of Korea Mar 2021 - Current  
Electrical and Electronic Engineering Associate Professor

- **Recent research Topics :**
  - **Transmission expansion cost allocation**
  - **DSO-ISO Configuration**
  - **Transmission expansion plan with unit commitment**

**KonKuk University**, Seoul, Republic of Korea Mar 2017 - Feb 2020  
Electrical and Electronic Engineering Assistant Professor

**Arizona State University**, Tempe, AZ Nov 2016 - Feb 2017  
Electrical, Computer, and Energy Engineering (Dr. Kory Hedman) Post-Doctoral Researcher

- **ARPA-E Network Optimized Distributed Energy Systems (NODES):** Develop the advisory tool for PJM, MISO, and ERCOT so that the stochastic two-stage Security Constraint Economic Dispatch programs can generate proper price signals.

**KPMG Dallas**, Dallas, TX July 2015 - Oct 2016  
KPMG Lighthouse in the Business Process Group Department Senior Associate

- **Audit:** Calculate the Risk Insurance and Risk Adjustment payments for the Affordable Care Act (ACA), and Extract statistical evidences to evaluate the performance of ACA projects.
- **Analysis:** Study the effect of issuers' individual strategies and skills on the performance of ACA projects, payments neutralization, and risk and premium reduction.
- **New Business Proposal:** Develop the framework for the health care fraud, abuse, and waste detection through the anomaly detection algorithms.

**E. On Climate & Renewable North America**, Austin, TX Jun 2014 - Aug 2014  
Transmission and Market Department Market Analyst

- Forecast the long-term renewable energy credit (REC) price in the ERCOT, MISO, and PJM through the demand and supply analysis

**Argonne National Laboratory**, Chicago, IL Jun 2013 - Aug 2013  
Center for Energy, Environmental, and Economic system Research Assistant

- Forecast the day-ahead solar irradiance by collecting big weather data on Toll-way remote weather sensors around Chicago.

**Sun Power** , Austin, TX Jun 2012 - Aug 2012  
 Electrical Engineering Team Electrical Engineer

- Analyze the stability of multi-input and multi-output solar farm controller.

**Xtreme Power**, Austin, TX Sep 2011 - Dec 2011  
 Strategic Planning Team Business Model Developer

- Develop the electricity price arbitrage algorithm to optimize the storage operation based on the forecasted price and solar power outputs by solving the quadratic optimization problem.

**Naval Ship Yard**, Jinhae, Republic of Korea Mar 2004 - Jun 2007  
 Naval Maintenance and Research Center Lieutenant Junior, Senior Researcher

- Develop test bench for a navigation system using MC68000 CPU.

### ACADEMICAL EXPERIENCE

University of Texas at Austin, Austin, TX Sept 2011 - May 2015  
 Dr. Baldick's Research Group Graduate Research Assistant

- **Analyze the wind power variability and its affect to the power system**

University of Texas at Austin, Austin, TX May 2009 - Dec 2010  
 Dr. Santoso's Research Group Graduate Research Assistant

- **Analyze voltage phase angle from phasor measurement units (PMU) using Short Time Fourier Transform (STFT) and Wavelet Analysis (WA)**

### HONORS

- **Korea young professional in power academy** Nov. 2022
- **Best Editor of Journal of Electrical Engineering and Technology** Nov. 2022
- **Best Reviewer of Journal of Electrical Engineering and Technology** Nov. 2022
- **Best Editor of Journal of Electrical Engineering and Technology** Nov. 2021
- **Best Reviewer of Journal of Electrical Engineering and Technology** Nov. 2021
- **H Energy Solar Power Forecasting Competition with team A 1st** Aug. 2021
- **H Energy Solar Power Forecasting Competition with team B 4th** Aug. 2021
- **Fuzz-IEEE Explainable Energy Prediction Competition 3rd** Aug. 2021
- **IEEE Forecasting Competition: Day-Ahead Electricity Demand Forecasting: Post-Covid Paradigm 4th** Aug. 2021
- **Weather Big Data Forecasting Contest, Winner** Aug. 2020
- **Korea Power Exchange Solar Power Forecasting Competition, 2nd** Aug. 2019
- **Korea Power Exchange Wind Power Forecasting Competition, 3rd** Aug. 2019
- **World young professional in power academy** Mar. 2017
- **IEEE Transactions on Smart Grid Best Reviewer 2015 by PES** Jan. 2016
- **2016 European Energy Market Price Forecasting Competition (8 th )** April. 2016
- **2015 Global Energy Forecasting Competition (Wind Power) by Power and Energy Society (PES) (6 th )** Jan. 2015
- **2015 Global Energy Forecasting Competition (Solar Power) by Power and Energy Society (PES) (4 th / \$500 )** Jan. 2015
- **2012 Global Energy Forecasting Competition (Wind Power) by Power and Energy Society (PES) (4 th / \$800)** Jul. 2013
- **Scholarship by Korea Institute of Energy and Resources (\$60,000)** Jun. 2007

- **Cum Lade Graduation Award, Pohang University of Science and Technology (POSTECH)**

Feb. 2004

### WORKING PAPERS

1. W. Choi, D. Lee, "Detouring Bottleneck Transmission Expansion Plans by using the Fair Cost Allocation Algorithm based on the Stochastic Cooperative Game Theory," *IEEE Transactions on Power System*, **In Preparation**.
2. W. Choi, W. Kyun, D. Lee, "Transmission Expansion Planning based on Unit Commitment and Contingency Analysis," *IEEE Transactions on Power System*, **In Preparation**.
3. Y. Cho, D. Lee, R. Baldick "Wind Power Scenario Generation based on the Generalized Dynamic Factor Model and 3D-Deep Convolutaional Generative Adversarial Network," in *IEEE Transactions on Sustainable Energy*, **In Preparation**
4. HyeonJin Kim, Duehee Lee, "Optimal Control of Building Heat Ventilation and Air Conditioning," *IEEE Transactions on Smart Grid*, **In preparation**.

### PUBLICATIONS: JOURNALS

1. B. Oh, S. Kim and D. Lee, "Wind Power Scenario Synthesis With Smoothing Effect Through Spectral Decomposition and Its Application to Flexible Resource Adequacy," in *IEEE Transactions on Sustainable Energy*, doi: 10.1109/TSTE.2022.3225272, **Accepted**.
2. Y. -H. Cho, J. -G. Chae and D. Lee, "Similarity-Based Optimization Framework for Curtailment Service Providers Through Collaborative Filtering and Generalized Dynamic Factor Model," in *IEEE Transactions on Smart Grid*, vol. 14, no. 2, pp. 1056-1069, March 2023
3. Kim, S., Oh, B. Lee, D. Application of an Operating Reserve Demand Curve in ERCOT in the South Korean Electricity Market to Accommodate High Penetration Levels of Renewable Energy. *Journal of Electrical Engineering & Technology* (2023). <https://doi.org/10.1007/s42835-023-01417-y>
4. Oh, B., Lee, D. Cooperative P2P Transaction Framework Between DSO and PMO Based on Consensus ADMM Against Path-Sharing Distribution Network Congestion. *Journal of Electrical Engineering & Technology* (2023). <https://doi.org/10.1007/s42835-023-01419-w>
5. Rahimi, N., Park, S., Choi, W. et al. A Comprehensive Review on Ensemble Solar Power Forecasting Algorithms. *Journal of Electrical Engineering & Technology*. 18, 719–733 (2023). <https://doi.org/10.1007/s42835-023-01378-2>
6. B. Oh, D. -H. Lee and D. Lee, "Oil-Price Based Long-Term Hourly System Marginal Electricity Price Scenario Generation," in *IEEE Access*, vol. 10, pp. 25051-25061, 2022, doi: 10.1109/ACCESS.2022.3155819.
7. Oh, B., Lee, DH., Jeong, WC. et al. Distributed Optimal Power Flow for Distribution System Using Second Order Cone Programming and Consensus Alternating Direction Method of Multipliers. *Journal of Electrical Engineering & Technology* 17, 999–1008 (2022). <https://doi.org/10.1007/s42835-021-00963-7>
8. Bai, Wenlei, Duehee Lee, and Kwang Y. Lee. "A Multivariate Stochastic Spatiotemporal Wind Power Scenario Forecasting Model." *Intelligent Data Mining and Analysis in Power and Energy Systems: Models and Applications for Smarter Efficient Power Systems* (2022): 201-222.
9. H. Kim and D. Lee, "Probabilistic Solar Power Forecasting Based on Bivariate Conditional Solar Irradiation Distributions," in *IEEE Transactions on Sustainable Energy*, vol. 12, no. 4, pp. 2031-2041, Oct. 2021, doi: 10.1109/TSTE.2021.3077001.
10. S. Han, D. Lee and J. -B. Park, "Optimal Bidding and Operation Strategies for EV Aggregators by Regrouping Aggregated EV Batteries," in *IEEE Transactions on Smart Grid*, vol. 11, no. 6, pp. 4928-4937, Nov. 2020, doi: 10.1109/TSG.2020.2999887.
11. H. -J. Kim, W. Kwon, S. Kim and D. Lee, "MPC-Based Optimal Operation for a PV Farm With Dual ESSs Using Spectral Density Analysis of Market Signals," in *IEEE Access*, vol. 8, pp. 215457-215466, 2020, doi: 10.1109/ACCESS.2020.3041593.

12. Han, Sini, Hyeon-Jin Kim, and Duehee Lee. 2020. "A Long-Term Evaluation on Transmission Line Expansion Planning with Multistage Stochastic Programming" *Energies* 13, no. 8: 1899. <https://doi.org/10.3390/en13081899>
13. Seungwoo Son, Kyemyung Jung, Gi Soo Kim, Duehee Lee. "A Study on Optimal Operations of an Energy Storage System by Using the Multi-Stage Stochastic Optimization and Progressive Hedging Algorithm" *The Transactions of the Korean Institute of Electrical Engineers* Vol.68 No.12 (2019) pp.1542-1550 : 1975-8359
14. Soo Yeon Kim, Wookhyun Kwon, Hyeonjin Kim, Jung Kyemyung, Giso Kim, Taehyoung Shim and Duehee Lee. "Offer Curve Generation for the Energy Storage System as a Member of the Virtual Power Plant in the Day Ahead Market" *Journal of Electrical Engineering & Technology* 14, no.6 (2019) : 2277-2287.
15. Seungwoo Son, Sini Han, Jae Hyung Roh, Duehee Lee, "Optimal offer strategies for energy storage system integrated wind power producers in the day-ahead energy and regulation markets ," *Journal of Electrical Engineering & Technology*, Vol. 13, no. 6, 2236-2244, Nov. 2018.
16. Duehee Lee, Yong-Gi Park, Jong-bae Park, Jae Hyung Roh , "Very short-term wind power ensemble forecasting without numerical weather prediction through the predictor design," *Journal of Electrical Engineering & Technology*, Vol. 12, no. 6, 2177-2186, Nov. 2017.
17. Wenlei bai, Duehee Lee, Kwang Y. Lee, "Stochastic dynamic AC optimal power flow based on a multivariate short-term wind power scenario forecasting model," *Energies*, Vol. 10, no. 12, 2138-2149, Dec. 2017.
18. Min-Kyu Baek, Duehee Lee, "Spatial and temporal day-ahead total daily solar irradiation forecasting: ensemble forecasting based on the empirical biasing," *Energies*, Vol. 11, no. 1, 70-81, Dec. 2017.
19. Duehee Lee, Hunyoung Shin, Ross Baldick, "Bivariate probabilistic wind power and real-time price forecasting and their applications to wind power bidding strategy development," *Power Systems, IEEE Transactions on*, vol. 33, no. 6, 6087-6097, Apr. 2018.
20. Hunyoung Shin, Duehee Lee, Ross Baldick, "An offer strategy for wind power producers that considers the correlation between wind power and real-time electricity prices," *Sustainable Energy, IEEE Transactions on*, vol. 9, no. 2, 695-706, Sep. 2017.
21. Duehee Lee, Yong-Gi Park, Jong-Bae Park, Jae-Hyung Roh , "Very Short-Term Wind Power Ensemble Forecasting without Numerical Weather Prediction through the Predictor Design," *Journal of Electrical Engineering & Technology*, Vol. 12, no. 6, 2177-2186, Nov. 2017.
22. Duehee Lee, Ross Baldick, "Load and Wind Power Scenario Generation through the Generalized Dynamic Factor Model," *Power System, IEEE Transactions on*, vol. 32, no. 1, 400-410, May 2016.
23. Hector Chavez, Duehee Lee and Ross Baldick, "CPS1-Compliant Regulation Using a PSD Analysis of Wind Expansion in a Single Balancing Authority," in *IEEE Transactions on Sustainable Energy*, vol. 6, no. 3, pp. 976-983, July 2015.
24. Duehee Lee and Ross Baldick, "Future Wind Power Scenario Synthesis Through Power Spectral Density Analysis," *Smart Grid, IEEE Transactions on*, vol.5, no.1, pp.490, 500, Jan. 2014.
25. Duehee Lee and Ross Baldick, "Short-term wind power ensemble prediction based on gaussian processes and neural network," *Smart Grid, IEEE Transactions on*, vol.5, no.1, pp.501,510, Jan. 2014.
26. Duehee Lee, Joonhyun Kim, and Ross Baldick, "Stochastic Optimal Control of the Storage System to Limit Ramp Rates of Wind Power Output", *Smart Grid, IEEE Transaction on*, vol.4, no.4, pp.2256,2265, Dec. 2013.

## Funding

1. **Ministry of Small and Medium Enterprises and Startups Research Fund:**
  - Develop the business model for curtailment service providers.
  - Principle Investigator // Jul 2019 - Feb 2020 // \$ 20,000
2. **Korea Power Exchange Research Fund:**
  - Calculate the flexibility index of power system
  - Principle Investigator // Apr 2019 - Mar 2020 // \$ 120,000
3. **National Research Foundation of Korea Research Fund:**
  - Develop the ESS control algorithm by using the stochastic dual dynamic programming
  - Principle Investigator // Mar 2019 - Feb 2020 // \$ 50,000
4. **Korea Institute of Energy Technology Evaluation and Planning Research Fund:**
  - Develop the algorithm for the open automatic demand response in large-scale buildings.
  - Principle Investigator // Jan 2019 - Dec 2019 // \$ 312,000
5. **Korea Power Exchange Research Fund:**
  - Suggest the future research direction for Korean power system.
  - Principle Investigator // Oct 2017 - Jul 2018 // \$ 139,000