

Beopsoo Kim

Department of Electrical and Computer Engineering

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Education

Aug. 2020 –	Inha University	Incheon, Republic of Korea
Aug. 2026 (Expected)	Department of Electrical and Computer Engineering <i>Ph.D. Candidate</i> Advisor: Prof. Insu Kim	
Mar. 2013 –	Inha University	Incheon, Republic of Korea
Aug. 2020	Department of Electrical Engineering <i>Bachelor of Science in Electrical Engineering</i>	

Research Interests

- **Developing an algorithm that optimal control of AC-DC hybrid power grids**
- **Developing an analysis algorithm of AC-DC hybrid power grid response:**
 - ✓ Power flow analysis
 - ✓ Fault analysis
 - ✓ Stability analysis
- **Using optimization algorithms and artificial intelligence (AI) to inform the design of more effective electrical power distribution (Focusing on Power Grid Resilience)**

Journal Articles (Peer-Reviewed) (*: Corresponding Author)

1. **Beopsoo Kim**, Youngmin Gong, Wonyoung Choi, and Insu Kim*, "EV Charging Ecosystems: An Integrated Review of Infrastructure Development and Pricing Mechanisms", *Energy Strategy Reviews*, March 2026
2. **Beopsoo Kim** and Insu Kim*, "Optimal Circuit Breaker Allocation Strategy in DC Transmission-connected Systems", *Scientific Reports*, October 2024
3. Jiyeon Jang, **Beopsoo Kim** and Insu Kim*, "Comparative Analysis of Deep Learning Techniques for Load Forecasting in Power Systems using Single-Layer and Hybrid Models", *International Transactions on Electrical Energy Systems*, May 2024
4. **Beopsoo Kim** and Insu Kim*, "A case study of stand-alone hybrid power systems for a data center using HOMER and DIgSILENT", *Energy Reports*, March 1, 2023
5. Kwonchul Kim, **Beopsoo Kim**, and Insu Kim*, "A study on the global HVDC trends and the current status of HVDC in Korea", *The Transactions of the Korean Institute of Electrical Engineers*, February 2023
6. Insu Kim, **Beopsoo Kim** and Denis Sidorov*, "Machine learning for energy systems 2021", *Energies*, June 2022
7. Kwonchul Kim, Youngjae Kim, **Beopsoo Kim**, and Insu Kim*, "A Study on Optimizing Underground Cable Maintenance and Replacement Cycles", *Journal of Electrical Engineering and Technology*, March 2022
8. **Beopsoo Kim**, Dayoung Lee, Nikita Rusetskii, Konstantin Shusterzon, Denis Sidorov, and Insu Kim*, "The Impact of the Energy Storage System Operation Strategy on Power Grid Reliability", *The Transactions of the Korean Institute of Electrical Engineers*, Vol. 70, No. 12, December 2021
9. **Beopsoo Kim**, Nikita Rusetskii, Haesung Jo and Insu Kim*, "The optimal allocation of distributed generators considering fault current and levelized cost of energy using the particle swarm optimization method", *Energies*, Vol. 14, No. 2, 418, January 13, 2021

Refereed Conference Proceedings (*: Corresponding Author)

1. **Beopsoo Kim**, Nikita Rusetskii, Denis Sidorov, and Insu Kim*, "Impact of Greedy Energy Storage Operation on Power System Stability: A Prosumer-Centric Approach", 2025 International Conference on Electrical Machines and Systems, Paradise Hotel Busan, Busan, November 16-19, Korea, 2025
2. **Beopsoo Kim** and Insu Kim*, "The Implementation of Sequential Hybrid AC-DC Power Flow Method", 2025 56th KIEE Summer Conference, BEXCO, Busan, July 16-19, Korea, 2025, in Korean
3. Soo-Young Kim, Seong-Ho Jeong, **Beopsoo Kim**, and Insu Kim*, "Review of The Impact of Climate Change and Disaster on Power Systems", 2025 56th KIEE Summer Conference, BEXCO, Busan, July 16-19, Korea, 2025, in Korean
4. **Beopsoo Kim** and Insu Kim*, "A Study of Synchronous Generator Control Using Lyapunov's Function Based Controller", IEEE PES General Meeting 2023 (Student Poster Session), Hyatt Regency Orlando, Florida, July 16-20, USA, 2023
5. **Beopsoo Kim** and Insu Kim*, "Speed up Power Flow Analysis Calculations with CUDA-based GPU Computing ", 2023 54th KIEE Summer Conference, Yongpyeong Resort, Gangwon-do, July 12-15, Korea, 2023, in Korean
6. Seonghyeon Kim, Byeongha Kim, Jaehan Kim, Hwanjin Kim, Seonggu Pak, **Beopsoo Kim**, Insu Kim*, Youngpyo Hong, Dohyung Kim, "The Control Strategy of Renewable Energy-based Microgrid Using C/C++ Language-based Programmable Logic Controller", 2023 54th KIEE Summer Conference, Yongpyeong Resort, Gangwon-do, July 12-15, Korea, 2023, in Korean
7. JaeYoung Jung, SeongEun Hong, ChanKoo Lee, **Beopsoo Kim**, Insu Kim*, "A Study of Distributed Generator and Three-winding Transformers Impact Analysis on Power Grid Fault Current Using MATLAB", 2023 54th KIEE Summer Conference, Yongpyeong Resort, Gangwon-do, July 12-15, Korea, 2023, in Korean
8. Seungjin Lim, **Beopsoo Kim**, Yonghee Lee and Insu Kim*, "A Study on The Verification of A Circuit Breaker Control System for Distribution Networks", 2022 KIEE A Group (Power and Energy) Autumn Conference, KEPCO Research Institute, Daejeon, Korea, 20-21, October, 2022, in Korean
9. **Beopsoo Kim** and Insu Kim*, "A Case Study of Stand-Alone Hybrid Power Systems for A Data Center Using HOMER and DIgSILENT", CPESE 2022, Doshisha University, Kyoto, September 9-11, Japan, 2022
10. **Beopsoo Kim** and Insu Kim*, "A Concept of Renewable Energy-based Rural Area Stand-alone Microgrid Design", 2022 53rd KIEE Summer Conference, Yeosu Expo Convention Center, Jeollanamdo, July 13-16, Korea, 2022, in Korean
11. **Beopsoo Kim** and Insu Kim*, "A Study of ESS Effect in Case of Distribution System Fault Using EMTP-RV", 2022 53rd KIEE Summer Conference, Yeosu Expo Convention Center, Jeollanamdo, July 13-16, Korea, 2022, in Korean
12. **Beopsoo Kim**, Jaeyeon Park, Insu Kim*, "A Study of Public Museum Power System Operation Economical Analysis Using HOMER", 2022 53rd KIEE Summer Conference, Yeosu Expo Convention Center, Jeollanamdo, July 13-16, Korea, 2022, in Korean
13. Yeo-Jin Ha, Go-eun Son, **Beopsoo Kim**, Insu Kim*, "A Concept of A Microgrid Analysis Platform Using HOMER and Tableau", 2022 53rd KIEE Summer Conference, Yeosu Expo Convention Center, Jeollanamdo, July 13-16, Korea, 2022, in Korean
14. Jeong-Hwan Yang, Duck-Hee Chung, Bo-Kyung Sung, **Beopsoo Kim**, Insu Kim*, "Analysis of the Unbalanced Rate of Scott Transformers using OpenDSS", 2022 53rd KIEE Summer Conference, Yeosu Expo Convention Center, Jeollanamdo, July 13-16, Korea, 2022, in Korean
15. Chan-Kyu Shin, Seung-Youp Ham, Chi-Woong Ahn, **Beopsoo Kim**, Insu Kim*, "A Study on The Algorithm for Building The Bus Impedance Matrix and The Effect of Distributed Generation on Short-circuit Currents Using Python", 2022 53rd KIEE Summer Conference, Yeosu Expo Convention Center, Jeollanamdo, July 13-16, Korea, 2022, in Korean
16. **Beopsoo Kim**, Dayeon Jeon and Insu Kim*, "A Study of Wind Fault Detection Using Artificial Intelligence", ICEE 2022, Seoul, Korea, June 28 - July 2
17. **Beopsoo Kim**, Dayoung Lee, Nikita Rusetskii, Konstantin Shusterzon, Denis Sidorov, Minseok Song, and Insu Kim*, "A Study on The Effect of Energy Storage System Optimal Operation with Distributed Generators on System

Reliability", 2021 International Conference on Electrical Machines and Systems, HICO, Gyeongju, Korea, Oct.31-Nov.3, 2021

18. **Beopsoo Kim**, Nikita Rusetskii, Konstantin Shusterzon, Denis Sidorov, and Insu Kim*, "The Optimal Operation of Energy Storage System with Distributed Generators by Using Data-based Prediction Method", 2021 52nd KIEE Summer Conference, Yongpyeong Resort, Gangwon-do, July 14-17, Korea, 2021, in Korean
19. Jong-Ho Won, Ji-Won Lee, **Beopsoo Kim**, and Insu Kim*, "The Calculation of Three-phase Line Impedance Using An Approximated Model of Carson's Formula for Ground Return Impedance", 2021 52nd KIEE Summer Conference, Yongpyeong Resort, Gangwon-do, July 14-17, Korea, 2021, in Korean
20. Byeonggwon Ahn, **Beopsoo Kim**, Haesung Jo, Insu Kim*, "A Study on the Fault Diagnosis of Wind Turbines using SVM based on Cross Validation", 2021 KIEE Spring Conference, Jeju, South Korea, 4/22-24, 2021
21. Youngjae Kim, **Beopsoo Kim**, Insu Kim*, "A Study on Optimizing Underground Cable Maintenance and Replacement Cycles," 2021 KIEE Spring Conference, Jeju, South Korea, 4/22-24, 2021
22. **Beopsoo Kim**, Nikita Rusetskii, Haesung Jo and Insu Kim*, "Optimal Distributed Generation Selection Using Particle Swarm Optimization", 2020 International Conference on Electric-Vehicle, Smart Grid and Information Technology, ICC JEJU, Seogwipo, Jeju Special Self-Governing Province, Korea, September 16-18, Korea, 2020, in Korean
23. **Beopsoo Kim**, Haesung Jo and Insu Kim*, "A Study Inverter-based Fault Current Analysis for The Optimization of Distributed Generator Location", 51st 2020 KIEE Summer Conference, Bexco, Haeundae-gu, Busan, South Korea, July 15-17, 2020, in Korean.
24. Haesung Jo, **Beopsoo Kim** and Insu Kim*, "A Study on The Optimization Scheduling of Combined Heat and Power System", 51st 2020 KIEE Summer Conference, Bexco, Haeundae-gu, Busan, South Korea, July 15-17, 2020, in Korean.
25. Haksoon Im, **Beopsoo Kim** and Insu Kim*, "A Study on Optimal Transformer Maintenance Scheduling", 2019 KIIEE Fall Conference, Incheon Airport Aviation Academy, Jung-gu, Incheon, South Korea, Nov 7-8, 2019, in Korean.
26. **Beopsoo Kim** and Insu Kim*, "Optimization of Distributed Generators Considering Fault Current and Installation Costs", 50th 2019 KIEE Summer Conference, Daemyung Delpino Golf & Resort & Hotel, Goseong-gun, Gangwon-do, South Korea, July 10-12, 2019, in Korean.

Manuscripts in Preparation/Submission (*: Corresponding Author)

1. (Under review) **Beopsoo Kim**, Changhyun Chung, Hyoungkwon Kim, Dong-jin Yoon, Dongchan Joo, Joohan Lee, Wangeun Ji, and Insu Kim*, "Estimation of Distribution System Parameters Using a Programmable Logic Controller and Kalman Filtering"
2. (Under review) **Beopsoo Kim** and Insu Kim*, "Quantifying and Mitigating Voltage Collapse Under Severe Phase Unbalance Using Standard Distributed Energy Resources: A Sarawak Microgrid Case Study"
3. (Under review) **Beopsoo Kim** and Insu Kim*, "Real-Time Robust VPP Scheduling under Forecast Uncertainty: A Tensor-Based Parallel MCTS Approach"
4. **Beopsoo Kim**, Changhyun Chung, Hyoungkwon Kim, Dong-jin Yoon, Dongchan Joo, Joohan Lee, and Insu Kim*, "Data-Driven Optimization of Autonomous PV-ESS Systems in Antarctica: A Case Study from Jang Bogo Station"
5. **Beopsoo Kim** and Insu Kim*, "Assessing Uncertainty in Heuristic-Based DG Optimization: A Statistical Causal Inference Approach"

Awards and Honors

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| 13. Dec. 2025 | Bronze Medal Paper , 2025 IEEE Seoul Section Student Paper Contest, Hana Square, Korea University, South Korea, December 13, 2025 |
| 14. Feb. 2025 | Outstanding Research Award , Inha University Graduate School |
| 06. Feb. 2024 | Outstanding Research Award , Brain Korea 21 (BK 21) Research and Education Group of Inha University |
| 02. Dec. 2023 | Bronze Medal Paper , 2023 IEEE Seoul Section Student Paper Contest, Hana Square, Korea University, South Korea, December 2, 2023 |

- 19. Oct. 2023 **Best Paper Award**, KIEE Electric Power Technology Section
- 21. Feb. 2023 **Excellence Prize**, Graduate course extracurricular program design competition, Inha University
- 01. Nov. 2022 **Gold Prize**, Undergraduate course curriculum design competition, Inha University
- 13. June. 2022 **Inha Vision Scholarship (full tuition for four semesters)**, Inha University
- 22. Nov. 2021 **Registration fee of Scientists and Engineers Early Career Development Workshop 2021** held by Korean-American Scientists and Engineers Association, funded by The Korean Federation of Science and Technology
- 27. Aug. 2021 **Registration fee of 2021 Canada-Korea Conference on Science and Technology**, funded by The Korean Federation of Science and Technology (KOFST)
- 16. July. 2021 **Excellence award in Graduate students' outstanding paper session**, 2021 KIEE 52nd Summer Conference, Yongpyeong Resort, Gangwon-do Korea
- 16. July. 2021 **Graduate students' outstanding paper**, 2021 KIEE 52nd Summer Conference, Yongpyeong Resort, Gangwon-do Korea
- 12. Dec. 2020 **Bronze Medal Paper**, 2020 IEEE Seoul Section Student Paper Contest, Ajou University, Suwon, Korea
- Sep. 2020 **Brain Korea (BK) 21 Fellowship**, National Research Foundation of Korea, Sep.2020 – Feb. 2025
- Aug. 2020 **Advisor Recommendation Scholarship (full tuition for four semesters)**, Inha University
- 24. Nov. 2018 **Bronze Medal Paper**, 2018 IEEE Seoul Section Student Paper Contest, Hongik University, Seoul, Korea
- 02. Nov. 2018 **Bronze Prize**, 2018 Student Contest on Power Systems Engineering Software, KIEE Power Systems Engineering Subcommittee, Kimdaejung Convention Center, Gwangju, South Korea

Research Experiences

- **Research Assistant** at *Department of Electrical and Computer Engineering, Inha University* Aug. 2020 – Present
- **Research Intern** at *Department of Electrical Engineering, Inha University* Jan. 2019 – Aug. 2020

Participated Projects

- **The development of an optimal operation method of protection devices for distribution systems with renewable energy resources that focuses on reliability indices and the study on the effect on the proposed method on power quality** May. 2019 – Apr. 2022
 - ✓ Funded by Korea Electric Power Corporation (KEPCO)
 - ✓ Researched how inverter-based distributed generators affect the grid when a fault occurred at the grid.
 - ✓ Conducted a case study on the optimal allocation of the distributed generator considering fault current and leveled cost of energy.
- **The algorithms of controlling electrical and thermal energy resources isolated from the grid in real time using reinforcement learning** June. 2019 – Feb. 2022
 - ✓ Funded by National Research Foundation (NRF) of Korea
 - ✓ Conducted a case study of the optimal scheduling of the combined heat and power system.
- **Design of Energy Cloud Cyber Physical System and Development of Optimal Operation Scheme** Aug. 2020 – Dec. 2023
 - ✓ Funded by National Research Foundation (NRF) of Korea

- ✓ Conducted an AI-based algorithm development of fault detection based on data.
- ✓ Conducted the power flow analysis speed acceleration method using GPU computing.
- **The design and implementation of cooperative vehicles for Antarctic exploration (The design of DC and AC grids for cooperative vehicles and observation equipment used in the Antarctic area)** Apr. 2021 – Dec.2025
 - ✓ Funded by Korea Polar Research Institute (KOPRI)
 - ✓ Conducted the design of observation station's power system based on renewable energy.
 - ✓ Designed PLC-based microgrid control panel and made control logic.
- **A design of AC-DC hybrid distribution system analysis technique for renewable energy-based data center operation** June. 2022 – Feb. 2025
 - ✓ Funded by National Research Foundation (NRF) of Korea
 - ✓ Conducted the algorithm design for hybrid AC-DC power grid analysis as follows:
 - 1) Power flow analysis
 - 2) Stability analysis
 - 3) Fault analysis.
- **The harmonic wave analysis algorithm development on three-phase unbalanced distribution network** June. 2022 – May. 2025
 - ✓ Funded by Korea Electric Power Corporation (KEPCO)
 - ✓ Designed and developed a data center's power distribution system as testbed.

Teaching Experiences

- **Teaching Assistant at Inha University** Mar. 2025 – Aug. 2026
 - ✓ EEC2202 Engineering Circuit Analysis 2 (Fall 2025, Undergraduate)
 - ✓ EEC2204 Electromagnetics 2 (Spring/Fall 2025, Undergraduate)
 - ✓ IGI5019 Analysis of Electric Machines (Spring/Fall 2025, Graduate)
 - ✓ EEC2102 Engineering Circuit Analysis 1 (Spring 2025, Undergraduate)
 - ✓ EEC2104 Electromagnetics 1 (Spring 2025, Undergraduate)
 - ✓ GEE7013 Understanding of New Renewable Energy (Spring 2025, Undergraduate)
 - ✓ EEC4700 New Renewable Energy (Fall 2025, Undergraduate)
- **Teaching Assistant at Inha University** Sep. 2024 – Dec. 2024
 - ✓ EEE2004 Electromagnetics 2 (Fall 2024, Undergraduate)
 - ✓ EEE2002 Engineering Circuit Analysis 2 (Fall 2024, Undergraduate)
 - ✓ EEE3313 New Renewable Energy (Fall 2024, Undergraduate)
 - ✓ IGI5033 Renewable Energy Engineering (Fall 2024, Graduate)
- **Teaching Assistant at Inha University** Aug. 2023 – Dec. 2023
 - ✓ EEE3325 Power System Operation and Control (Fall 2023, Undergraduate)
 - ✓ EEE4001 Capstone Design in Electrical Engineering (Fall 2023, Undergraduate)

- ✓ ECE7110 Principles of HVDC systems (Fall 2023, Graduate)

- **Teaching Assistant at Inha University**

Aug. 2020 – Aug. 2021

- ✓ EEE2004 Electromagnetics 2 (Fall 2020, Undergraduate)
- ✓ EEE2003 Electromagnetics 1 (Spring 2021, Undergraduate)
- ✓ EEE3313 New Renewable Energy (Spring 2021, Undergraduate)
- ✓ EEE2001 Engineering Circuit Analysis 1 (Spring 2021, Undergraduate)

Extra-curricular Educations

1. Scientific journals writing for STEM graduate students, Korea Institute of Human Resource Development in Science and Technology, June 06, 2025
2. Self-career development design for STEM graduate students' course, Korea Institute of Human Resource Development in Science and Technology, February 22-23, 2023
3. Post-doctoral researcher basic R&D ability course, Korea Institute of Human Resource Development in Science and Technology, November 21-22, 2022
4. OpenDSS Training Workshop 2022, EPRI, Online, 2022
5. Power system fault analysis, the concept of directional protection relays and KEC overcurrent protection, KIEE and IEEE PES Seoul Section, Jeju, Korea, 25-28, April, 2022
6. 2021 Virtual OpenDSS Training Workshop, EPRI, Online, 2021
7. HVDC Transformation/Operation/Analysis technique 1, KIEE and IEEE PES Seoul Section, Jeju, Korea, 9-13, August, 2021
8. Technology for securing flexibility/stability of wind power generation to improve the acceptance rate of variable renewable energy, KIEE and IEEE PES Seoul Section, Jeju, Korea, 29-31, March, 2021

Skills

- Programming languages: C/C++, MATLAB, Python, R, Julia, IEC 61131 (Ladder, Structed text)
- Language: Native in Korean, Fluent in English and Japanese
- Using tools: Simulink, OpenDSS, HOMER-Pro, PSCAD/EMTDC, DIgSILENT® PowerFactory, Altair® PSIM, Mitsubishi GX-Works, SKM*Power Tools, Gurobi, MOSEK, Autodesk® AutoCAD, Autodesk® AutoCAD Electrical

Professional Service

Editorial and Review Service for Manuscripts

1. Reviewer, IET Generation, Distribution and Transmission Systems
2. Reviewer, Energy (Elsevier)

Community Engagement and Professional Service

- **Co-Presenter (with Prof. Insu Kim) at Inha University**, STEM Outreach Program
 - ✓ Invited joint presentation on "Introduction to Electrical Engineering and Future Career Paths" to Gyesan High School and Dongsan High School District (Oct.30 and Nov. 19, 2025)

Invited Talks, Seminars and Presentations

- 1. Real-Time Robust Operation of Virtual Power Plants considering Forecast Uncertainty**
Held on Machine Learning, Computer Vision, and Dynamic Systems Group (PI: Denis Sidorov, Fellow, IEEE)
Date: 4th of December, 2025
Language: English
Place: *Virtual*
- 2. Impact of Greedy Energy Storage Operation on Power System Stability: A Prosumer-Centric Approach**
Held on 2025 International Conference on Electrical Machines and Systems (ICEMS 2025)
Date: 18th of November, 2025
Language: English
Place: Paradise Hotel Busan, Busan, Republic of Korea
- 3. Particle swarm optimization based distributed generator allocation with consideration of outcome variation factors**
Held on Machine Learning, Computer Vision, and Dynamic Systems Group (PI: Denis Sidorov, Fellow, IEEE)
Date: 16th of January, 2025
Language: English
Place: *Virtual*
- 4. A Study of ESS Effect in case of distribution system fault using EMTP-RV**
Held on 53rd KIEE Summer Conference
Date: 14th of July, 2022
Language: Korean
Place: Yeosu Expo Convention Center, Jeollanamdo, Republic of Korea
- 5. A Study on The Effect of Energy Storage System Optimal Operation With Distributed Generators On System Reliability**
Held on 2021 International Conference on Electrical Machines and Systems
Date: 1st of November, 2021
Language: English
Place: HICO, Gyeongju, Gyeongsangbuk-do, Republic of Korea
- 6. Optimal Distributed Generation Selection Using Particle Swarm Optimization**
Held on 2020 International Conference on Electric-Vehicle, Smart Grid and Information Technology
Date: 17th of September, 2020
Language: English
Place: ICC JEJU, Seogwipo, Jeju Special Self-Governing Province, Korea

Other Relevant Experience / Work Experience

2013 – 2015	Republic of Korea Air Force 11 th Fighter wing, served as sergeant airman. <i>Responsible for supply and management of materials that maintain and repair airbase facilities.</i> <i>Selected as a battalion model airman and received a commendation.</i> <i>Interviewed with Defense Media Agency (Link)</i>	Daegu, Republic of Korea
2016 – 2023	Reservist, Republic of Korea Armed Force Served as reservist on Republic of Korea Armed Force	Incheon, Republic of Korea