

Gayoung Park

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RESEARCH INTERESTS

- Data Center Power Electronics
- Transportation Electrification
- Renewable Energy Integration
- Wide Bandgap Semiconductor Devices

EDUCATION

Seoul National University , Seoul, South Korea <i>M.S. student in Electrical and Computer Engineering</i> <i>Advisor: Shenghui Cui</i> Thesis: Optimization of Modulation Scheme and Transformer Design of Dual-Active Bridge Converter for Improved Efficiency	Mar. 2023 — Present Cumulative GPA: 3.98/4.3
École Polytechnique Fédérale de Lausanne (EPFL) , Lausanne, Switzerland <i>Exchange student in Electrical Engineering</i>	Feb. 2022 — Jun. 2022
Seoul National University , Seoul, South Korea <i>B.S. in Electrical and Computer Engineering (Honors: Summa cum laude)</i>	Mar. 2018 — Feb. 2023 GPA: 3.93/4.3

RESEARCH EXPERIENCES

40 kW Isolated DC-DC Converter Development for Bidirectional EV Fast Charger Graduate Student Researcher <i>Advisor: Prof. Shenghui Cui</i>	Sep. 2023 — Present <i>Seoul, South Korea</i>
<ul style="list-style-type: none">• Designed a high-density SiC-based dual-active bridge converter for a fast DC charger in collaboration with LG Innotek.• Optimized the physical design of a high-frequency transformer through experimental iteration to enhance efficiency.• Developed an optimization process to determine the optimal leakage inductance and turns ratio of the transformer.• Proposed an optimal modulation scheme for the DAB converter, maximizing ZVS capability and minimizing rms current.• Analyzed the soft-switching characteristics of the DAB converter to reduce switching and conduction losses.	

Analysis of Grid-Forming Control for Inverter-Based Resources and Control System Design Graduate Student Researcher <i>Advisor: Prof. Shenghui Cui</i>	Jan. 2023 — Present <i>Seoul, South Korea</i>
<ul style="list-style-type: none">• Developed an experimental setup for hardware-in-the-loop simulation of GFM control, in collaboration with Korea Electric Power Corporation Research Institute.• Designed a versatile control system based on the TMS320F28379D MCU, incorporating peripherals—ADC, ePWM, etc.• Investigated FRT strategies and current limitation techniques for GFM control in 3-level voltage source converters.• Proposed a stable and fast power-voltage control method for IBRs in weak grids using online nonlinear optimization.• Conducted research on the integration of supercapacitor-based ESSs to provide active inertia power in GFM control.	

Development of Core Technology for High-Temperature Superconducting Magnets Graduate Student Researcher <i>Advisors: Prof. Shenghui Cui, Prof. Seungyong Hahn</i>	Jan. 2023 — Mar. 2023 <i>Seoul, South Korea</i>
<ul style="list-style-type: none">• Assisted in setting up experiments to investigate superconducting magnet operation under a half-bridge inverter, in collaboration with the SNU Applied Superconductivity Laboratory.	

3.2 kW Titanium Plus Power Supply Development for Data Center Power Delivery Undergraduate Student Researcher <i>Advisor: Prof. Shenghui Cui</i>	Sep. 2022 — Feb. 2023 <i>Seoul, South Korea</i>
<ul style="list-style-type: none">• Supported the design of a high-efficiency totem-pole bridgeless PFC using SiC and GaN devices for data center power supplies, in collaboration with LG Innotek.• Conducted research on modulation schemes for totem-pole bridgeless PFC and analyzed efficiency measurement data.	

Development of Gate Driver Circuit for 3-Phase 2-Level Voltage Source Converter Exchange Undergraduate Student Researcher <i>Advisor: Prof. Drazen Dujic</i>	Feb. 2022 — Jun. 2022 <i>Lausanne, Switzerland</i>
<ul style="list-style-type: none">• Designed and tested a gate driver circuit for voltage sensing and interfacing with a 3-phase 2-level VSC.	

PUBLICATIONS

Journal Articles

1. G. Park, H. Kim, B.-K. Cho and S. Cui, "ZVS-Enhanced and RMS-Current-Minimized Optimal Modulation Scheme of Dual-Active Bridge Converter with Comprehensive ZVS Analysis," in *IEEE Transactions on Power Electronics, Under Review with Major Revisions*.
2. J. Maeng, J. Ham, G. Park, J. Park, J. -J. Jung, H. Wu and S. Cui, "A Supercapacitor Size Minimization and Energy Management Strategy for E-STATCOM Connected to Weak Grid," in *IEEE Journal of Emerging and Selected Topics in Power Electronics, Submitted*.
3. C. Im, J. Ham, J. Maeng, G. Kim, S. H. Park, J. Kim, J. Lee, G. Park, J. T. Lee, K. Choi, U. Bong, S. Cui, S. Hahn and S. Lee, "Nonlinear Characteristics of Metal-Insulated REBCO Magnet Under Various Switching Frequencies of Half-Bridge Inverter Circuit," in *IEEE Transactions on Applied Superconductivity*, vol. 34, no. 5, pp. 1-6, Aug. 2024, Art no. 4604906, doi: 10.1109/TASC.2024.3370092.

Conference Papers

1. G. Park, H. Kim and S. Cui, "Optimization of Transformer Design Parameters of a 20 kW SiC-Based Dual-Active Bridge Converter for Enhanced Efficiency," *2024 IEEE Energy Conversion Congress and Exposition (ECCE)*, Phoenix, AZ, USA, 2024, Accepted.
2. G. Park, J. Park, S. Cui and S. -K. Sul, "Nonlinear Optimization-Based Power-Voltage Control of Grid-Connected Converter in Weak Grid," *2024 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Long Beach, CA, USA, 2024, pp. 228-233, doi: 10.1109/APEC48139.2024.10509166.
3. G. Park and S. Cui, "Current Limiting FRT Strategy of Grid-Forming Converter," *2023 Korean Institute of Power Electronics (KIPE) Power Electronics Conference*, pp. 74-76, Jul. 2023. (in Korean)

HONORS & AWARDS

Domestic Graduate Scholarship, SBS Cultural Foundation

Fall 2023 — Present

Full tuition and monthly research grant for promising graduate students
(Selected as one of 9 recipients in 2023)

SNU Tomorrow's Engineers Membership (STEM)

Spring 2021 — Spring 2022

Honor society for engineering students demonstrating excellence in academic achievements

Yangyoung Foundation Scholarship

Spring 2020 — Fall 2021

Full tuition support for undergraduate students with outstanding academic performance

Basic Circuit Theory Project Excellence Award

Spring 2019

1st place out of 21 teams, *Topic: DIY electronic music box*

Academic Excellence Scholarship

Spring 2018

Full-ride scholarship awarded for academic excellence

Hanseong Son Jae-han Scholarship

2016 — 2017

Research grant for high school students with exceptional potential in scientific research

Korean Physical Society's Physics Camp for High School Girls

Summer 2015

2nd place, *Topic: Piezoelectric energy harvesting soccer ball*

Poster presentation at the 2015 KPS Fall Meeting

SELECTED COURSE PROJECTS

Temperature Estimation of SiC MOSFETs based on Temperature-Sensitive Optical Parameters

Fall 2022

Course: Power Semiconductor Devices

- Designed a light-receiving circuit considering the luminescence intensity profile of SiC MOSFETs.
- Assisted with experimental measurements of luminescence intensity and temperature under different operating currents.

1 kW BLDC Motor Control for Driving an Electric Scooter

Fall 2021

Course: Design Project for Electrical Devices and Systems

- Designed a control system using the TMS320F28379D MCU and a 3-phase 2-level voltage source inverter for driving an 1 kW BLDC motor powered by a 48 V battery.

PRESENTATIONS

Lab Visit Presentation, UC Berkeley

Winter 2024

Berkeley Power Electronics Center, University of California, Berkeley

- Presented research on development of 20 kW SiC-based dual-active bridge converter for EV charger, as a representative of the SNU Power Electronics Center, Seoul National University.

OTHER EXPERIENCES

Teaching Assistant, Seoul National University

- Selected Research Topics in Power Electronics Fall 2024
- Seminar on Electric Energy Conversion and Circuits for M.S. Students Spring 2024
- Design Project for Electrical Devices and Systems: Motor Drive for Electric Scooters Spring 2023, Fall 2023
- Introduction to Circuit Theory and Laboratory Spring 2023

Volunteer Experience, Seoul National University

- **Mentor for STEM Vision Mentoring Program** Summer 2021
 - *Guidance and roadmap exploration for high school students*
- **Mentor for AI Tech Play** Spring 2021
 - *AI education program for middle school students*
- **Service Award** Summer 2019
 - *Recognized for outstanding dedication and contributions to the E&CE student council*
- **Volunteer at Summer Engineering Camp** Summer 2019
 - *Engineering workshops for elementary school students*
- **Mentor for Dream Camp** Winter 2018
 - *Roadmap exploration mentoring for high school students in underprivileged areas*

LANGUAGES

Korean (Native), English (Professional working proficiency, iBT TOEFL Score: 108/120)

ADDITIONAL SKILLS

- **Programming:** C/C++, Python, MATLAB Simulink, L^AT_EX
- **Software:** PLECS, LTspice, Altium, KiCAD, Fusion 360, Code Composer Studio, Typhoon HIL