Gayoung Park

She/her/hers | Cambridge, MA | +1 (857)331-8085 | gypark@mit.edu | LinkedIn

Ph.D. student in Electrical Engineering and Computer Science at MIT specializing in power electronics. Skilled in PCB design, embedded control, optimization and prototype bring-up and debug. Hands-on experience designing, building, and experimentally validating high-power converters (up to 40 kW), motor drives, mixed-signal circuits, and microcontroller board through industry collaborations.

Education

Massachusetts Institute of Technology (MIT), Cambridge, MA — Sep. 2025 — Present
Ph.D. in Electrical Engineering and Computer Science (*Advisor: David J. Perreault*) — GPA: 4.00/4.00

Seoul National University, Seoul, South Korea — Mar. 2023 — Feb. 2025
M.S. in Electrical and Computer Engineering (*Advisor: Shenghui Cui*) — GPA: 4.02/4.3

Seoul National University, Seoul, South Korea — Mar. 2018 — Feb. 2023
B.S. in Electrical and Computer Engineering — GPA: 3.93/4.3

Technical Skills

- **Hardware design and testing:** schematic capture & PCB layout (Altium, KiCad); circuit simulation (LTspice, PLECS); magnetics design (Ansys); thermal design; prototype bring-up, test, and debug
- **Embedded control and simulation:** C/C++ firmware development for real-time control (TI C2000 MCUs, Code Composer Studio); Communication protocols (SPI, SCI); Python (PyTorch, TinyML); MATLAB/Simulink; hardware-in-the-loop testing (Typhoon HIL)

Experiences

1-MHz High-Step-Down LLC Converter for EV Applications — Sep. 2025 — Present
Graduate Student Researcher, MIT — *Cambridge, MA*

- Designed and optimized high-frequency magnetics and control strategies for a 1-MHz high-step-down LLC converter targeting EV low-voltage DC-DC systems (PLECS, LTspice, Ansys, Altium).

40 kW Isolated Dual-Active-Bridge DC-DC Converter for EV Fast Charger — Sep. 2023 — Feb. 2025
Graduate Student Researcher, Seoul National University (Collab. with LG Innotek) — *Seoul, South Korea*

- Designed and experimentally validated a high-density SiC-based 40 kW dual-active-bridge converter prototype for a bidirectional EV fast charger, achieving a peak efficiency of 98.8%.
- Developed a nonlinear optimization-based modulation scheme to maximize the ZVS range while minimizing RMS current — first-author, *IEEE Trans. Power Electron.*, Jul. 2025.

Grid-Forming Control and Fault-Ride-Through Design for Inverter-Based Resources — Jan. 2023 — Sep. 2024
Graduate Student Researcher, Seoul National University (Collab. with KEPCO Research Institute) — *Seoul, South Korea*

- Designed and validated a mixed-signal closed-loop controller board featuring a TI TMS320F28379D MCU, SPI, DACs, ADCs, PWM outputs, and hardware fault protection.
- Constructed a Typhoon HIL (Hardware-in-the-Loop) testbed to validate grid-forming control for 3-level VSCs.
- Formulated fault-ride-through and current-limiting strategies, and developed an online nonlinear optimization-based power-voltage control method to enhance stability in weak grids — first-author, *IEEE APEC 2024*.

3.2 kW Titanium Plus Power Supply for Data Center Applications — Sep. 2022 — Feb. 2023
Undergraduate Student Researcher, Seoul National University (Collab. with LG Innotek) — *Seoul, South Korea*

- Contributed to the hardware design of a SiC/GaN totem-pole bridgeless PFC stage for 80 PLUS Titanium data-center power supplies; analyzed advanced modulation schemes and empirical efficiency data.

Gate Driver Circuit Design for 3-Phase 2-Level Voltage Source Converter — Feb. 2022 — Jun. 2022
Exchange Undergraduate Student Researcher, École Polytechnique Fédérale de Lausanne (EPFL) — *Lausanne, Switzerland*

- Designed a gate-driver board incorporating isolated voltage sensing and controller interfaces for a 2-level VSC.

HDMI Retimer Circuit Development for Video Display — Jan. 2021 — Feb. 2021
Intern, Samsung Electronics — *Suwon, South Korea*

- Designed a mixed-signal repeater board integrating HDMI signal equalization and LDO-based power management circuits (Cadence OrCAD).

Selected Course Projects

Temperature Estimation of SiC MOSFETs based on Temperature-Sensitive Optical Parameters Fall 2022
Graduate Course: Power Semiconductor Devices

- Designed a light-receiving circuit for temperature-sensitive optical parameter sensing of SiC MOSFETs; performed experimental luminescence and temperature characterization under varying operating currents.

1 kW BLDC Motor Control for Driving an Electric Scooter Fall 2021
B.S. Thesis / Capstone Course: Design Project for Electrical Devices and Systems

- Designed and implemented a 1 kW BLDC motor drive (48 V battery, 3-phase 2-level inverter with control interface) with closed-loop control on the TI TMS320F28379D MCU, programmed in C via Code Composer Studio.

Selected Publications

1. G. Park and D. J. Perreault, "Design Optimization of a 1-MHz Planar Transformer for a High-Power-Density and High-Step-Down-Ratio LLC Converter," *2026 IEEE 26th Workshop on Control and Modeling for Power Electronics (COMPEL)*, Cambridge, UK, 2026, *Accepted*.
2. 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*, vol. 40, no. 7, pp. 9004-9018, July 2025, doi: 10.1109/TPEL.2025.3541847.
3. 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, pp. 3034-3039, doi: 10.1109/ECCE55643.2024.10861215.
4. 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.

Full publication list available upon request.

Other Experiences

Teaching Assistant, Seoul National University

- Assisted in teaching undergraduate and graduate courses: *Control of Electric Machine Drive Systems*; *Seminar on Electric Energy Conversion and Circuits (M.S.)*; *Design Project for Electrical Devices and Systems: Motor Drive for Electric Scooters*; and *Introduction to Circuit Theory and Laboratory*.

Volunteer Mentor, SNU STEM outreach programs 2018 — 2021

- Mentored K-12 students through STEM Vision, AI Tech Play, Dream Camp, and engineering camps; received SNU E&CE Service Award (2019).

Languages

English (Professional working proficiency), **Korean** (Native)