

Hyeongmeen Baik

Department of Electrical & Computer Engineering, University of Wisconsin - Madison, WEMPEC
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EDUCATION

University of Wisconsin - Madison, Madison, Wisconsin Aug 2023 — Expected 2028
Ph.D., Electrical & Computer Engineering
Wisconsin Electric Machines and Power Electronics Consortium (WEMPEC)
Advisor: *Prof. Jinia Roy*

Yonsei University, Seoul, Korea Mar 2017 — Feb 2023
B.S., Electrical & Electronic Engineering
Thesis: Short-term Photovoltaic Power Forecasting Model, based on Artificial Neural Network and Meteorological Factors
Advisor: *Prof. Jung-wook Park*

RESEARCH EXPERIENCE

WEMPEC, University of Wisconsin - Madison Madison, WI
Research Assistant (Advisor: *Prof. Jinia Roy*) Aug 2023 - Ongoing

- Developed solid-state Marx generator-based pulsed power systems, modular flat-top current compensators for magnetic confinement fusion, and power electronic solutions for dielectric barrier discharge (DBD) applications; analyzed power pulsation buffer (PPB) control for high-PAPR pulsed loads.
- Applied physics-informed neural networks (PINNs), spiking neural networks (SNNs), and reinforcement learning-augmented MPC for parameter identification, fault detection, and adaptive control of power converters.
- Designed GaN-based three-phase interleaved buck converter for electrochemical impedance spectroscopy (EIS) of water electrolyzers; developed multi-port extended-duty-ratio boost converter for hybrid power sources.
- Developed four-quadrant double-pulse test (DPT) circuit for systematic characterization and dynamic on-resistance evaluation of monolithic bidirectional GaN switches (MBDSs).

Design & Control Laboratory, KoreaTech Cheonan, Korea
Research Assistant (Advisor: *Prof. Ye gu Kang*) Apr 2022 - Jun 2023

- Developed linear Hall-effect sensor prototypes for x-y and rotary position estimation; designed optimal IPM rotor geometry via differential evolution; evaluated dual-mode machine (generator/motor) for maritime applications (Hyosung).

Communication Signal Processing Laboratory, Yonsei University Seoul, Korea
Research Intern (Advisor: *Prof. Chungyong Lee*) Jan 2022 – Mar 2022

- Evaluated autoencoder-based deep learning communication system performance; analyzed OFDM modulation and BER over multi- and single-path channels.

TEACHING EXPERIENCE

ECE 712, University of Wisconsin - Madison Madison, WI
Teaching Assistant (Supervisor: *Prof. Jinia Roy*) Spring 2026

- Led in-class discussions and addressed student questions during lectures and office hours.

ECE 412, University of Wisconsin - Madison Madison, WI
Teaching Assistant (Supervisor: *Prof. Jinia Roy*) Fall 2025, Fall 2026

- Developed active-learning materials designed for flipped-classroom instruction.
- Led in-class discussions and addressed student questions during lectures and office hours.

TUTORIALS & INVITED PRESENTATIONS

Hyeongmeen Baik and J. Roy, "Active Capacitor Circuit and Control Techniques for Transportation Electrification Systems," 90-min tutorial (peer-reviewed), *2026 IEEE Transportation Electrification Conference & Expo + IEEE Electric Aircraft Technologies Symposium (ITEC+EATS)*, Novi, MI, Jun 2026.

HONORS AND AWARDS

Best Presentation Award, APEC 2026	Mar 2026
Scholarship for Academic Excellence (Full-tuition), Yonsei University	Fall-2022, Spring-2021
Scholarship for Academic Excellence (Half-tuition), Yonsei University	Spring-2022, Fall-2021
Highest Honors (Top 1% of department), Yonsei University	Spring-2022, Fall-2020
High Honors (Top 3% of department), Yonsei University	Spring-2021, Fall-2019
Honors (Top 10% of department), Yonsei University	Fall-2021

PUBLICATIONS

Hyeongmeen Baik and J. Roy, "Review of Power Electronic Solutions for Dielectric Barrier Discharge Applications," *IEEE Transactions on Power Electronics*, 2026.

Hyeongmeen Baik and J. Roy, "EMI-Robust Physics-Informed Neural Networks for DC-DC Converter Parameter Identification," *2026 IEEE Energy Conversion Congress and Exposition (ECCE)*, 2026 (accepted, to appear).

Hyeongmeen Baik, S. Bae, and J. Roy, "Modeling and Dual-Mode Control of a Pulsed Buck Flashlamp Driver," *2026 IEEE Energy Conversion Congress and Exposition (ECCE)*, 2026 (accepted, to appear).

Hyeongmeen Baik, H. Poursiami, M. Parsa, and J. Roy, "Neuromorphic Parameter Estimation for Power Converter Health Monitoring Using Spiking Neural Networks," *2026 International Conference on Neuromorphic Systems (ICONS)*, 2026 (accepted, to appear); arXiv preprint arXiv:2604.15714, 2026.

S. Kapse, **Hyeongmeen Baik**, and J. Roy, "Design of High-Frequency, High-Voltage Planar Transformer for Driving Dielectric Barrier Discharge Loads," *2026 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Session D31.8, Mar 2026.

H. Kong, **Hyeongmeen Baik**, and J. Roy, "Double-Pulse Test Circuit for Four-Quadrant Characterization and Dynamic ON-Resistance Evaluation of Monolithic Bidirectional GaN Switches," *2026 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Session T22.2, Mar 2026.

Hyeongmeen Baik, I. Prabhu, and J. Roy, "Multi-Port Extended-Duty-Ratio Boost Converter for Hybrid Power Sources," *2025 IEEE Energy Conversion Congress and Exposition (ECCE)*, 2025, pp. 1-6.

P. Javidi, **Hyeongmeen Baik**, and J. Roy, "A Synchronous Gate Driver System for Series-Connected SiC MOSFETs for High-Voltage Pulsed Power Supplies Based on Magnetic Pulse Compression," *2025 IEEE Energy Conversion Congress and Exposition (ECCE)*, 2025, pp. 1-8.

A. Chinnusamy, **Hyeongmeen Baik**, and J. Roy, "High Power Density Solid State Marx Generator Based Pulsed Power Driver for Nonlinear Transmission Line," *2025 IEEE Energy Conversion Congress & Exposition Asia (ECCE-Asia)*, 2025, pp. 1-6.

Hyeongmeen Baik and J. Roy, "Modular Flat-Top High-Current Compensator for Flywheel Energy Storage System in Magnetic Confinement Fusion Applications," *2024 IEEE Energy Conversion Congress and Exposition (ECCE)*, Phoenix, AZ, USA, 2024, pp. 7352-7358, doi: 10.1109/ECCE55643.2024.10861038.

PREPRINTS / UNDER REVIEW

Hyeongmeen Baik and J. Roy, "Parametric Instability of Gain-Scheduled DC-DC Converters under Pulsed Loads: Monodromy Analysis and Design Guideline," submitted to *IEEE Transactions on Industrial Electronics* (under review), 2026.