JINYEONG MOON

Curriculum Vitae

April 4, 2024

Address: Department of Electrical and Computer Engineering
FAMU-FSU College of Engineering
2525 Pottsdamer Street B-368
Tallahassee, FL 32310
Phone: (617) 999-0846

Email: j.moon@fsu.edu

EDUCATION

2011–2016 **MIT,** Electrical Engineering and Computer Science
Ph.D.

2005–2007 **Stanford University,** Electrical Engineering
M.S.

2001–2005 **KAIST,** Electrical Engineering
B.S. – Summa cum laude

EMPLOYMENT

2019– **Florida State University,** FAMU-FSU College of Engineering
Assistant Professor

2017–2018 **Analog Devices** (Formerly Maxim Integrated Products)
Member of Technical Staff

2016–2017 **MIT,** Laboratory of Electromagnetic and Electronic Systems
Postdoctoral Associate

2007–2011 **SK Hynix Semiconductor Inc.**
Senior Research Engineer

2003–2004 **SK Hynix Semiconductor Inc.**
Design Intern

RESEARCH GRANTS

Total Award: $8,715,076 / PI Share: $1,202,746

2024–2025 **Z-source DC Circuit Breaker for MVDC/HVDC Grids**
Korea Electrotechnology Research Institute (KERI), $102,351 (PI: 100%) – Award Negotiation

2024–2026 **GaN-Enabled Dual Multi-level Inverter Integrated Electric Drive System**
US Department of Energy, Vehicle Technology Office, $7,500,000 (Co-PI: $400,000) – Award Negotiation

2024–2025 **Precision *In-situ* Power Measurement for Multi-port Magnetic Component**
Keysight Technologies, $120,000 (PI: 100%)

2023–2024 **Planning: Sustainable Demolition Research on Climate Change**
National Science Foundation (NSF), $100,000 (Co-PI: 33% - $33,000)

2023–2023 **Future Medium Voltage DC Breaking Topology Development**
KERI, $22,000 (PI: 50% - $11,000)

2023–2023 **3-Level Motor Drive without a Neutral Point with Optimal DC-Link Cap.**
Danfoss Turbocor, $20,000 (PI: 100%)

2023–2023 **High-performance GHz Current Measurement for Power Electronics**
Keysight Technologies, $119,625 (PI: 100%)

2022–2022 **High-Precision Power Loss Measurement of Lossy Magnetic Components**
Florida State University Committee on Faculty Research Support, $20,000 (PI: 100%)

2022–2023 **Precise, *In-situ*, In-operation Magnetic Loss Measurement**
Keysight Technologies, $98,100 (PI: 100%)

2021–2022 **Precise, *In-situ*, In-operation Magnetic Loss Measurement**
Keysight Technologies, $44,000 (PI: 100%)

2020–2022 **Intelligent Power Stages**
US Department of Energy, $499,000 (Co-PI: 33% - $166,333)

2020–2020 ***In-situ* Direct Magnetic Power Loss Measurement in a DC-DC Converter**
Florida State University Committee on Faculty Research Support, $20,000 (PI: 100%)

2020–2021 **Backup Power for Signalized Intersections after Hurricanes**
State of Florida Department of Transportation, $50,000 (PI: 100%)

PUBLICATIONS

JOURNAL ARTICLES

1. M. Benson, X. Dong, L. Yi, K. Lee, **J. Moon**, W. Lee, "Achieving Multilevel Voltages without a Neutral Point Connection in a Multilevel Inverter," in *IEEE Transactions on Power Electronics*. (In Revision)
2. L. Yi, **J. Moon**, "Accurately Disentangling Core and Winding losses in Experimental, *In-situ*, Magnetic Loss Measurement for Power Electronic Circuits and Applications," in *IEEE Journal of Emerging and Selected Topics in Power Electronics*, Apr. 2024. (Under Review)
3. M. Benson, X. Dong, K. Lee, **J. Moon**, W. Lee, "NPL.X: Neutral-Point-Less X-type Three-Level Inverter," in *IEEE Transactions on Power Electronics*. (Under Review)
4. M. Gao, L. Yi, **J. Moon**, "Intra-cycle Gapless Core Desaturation via Crisscross Switches for Maximal Magnetic Energy Harvesting," in *IEEE Transactions on Industrial Electronics*. (Under Review)
5. M. Gao, L. Yi, **J. Moon**, "Enabling Multiple Harvesting Windows in Magnetic Energy Harvesting via Reverse Flux Desaturation," in *IEEE Journal of Emerging and Selected Topics in Power Electronics*, Apr. 2024 (Accepted – Early Access)
6. X. Dong, M. Benson, K. Lee, L. Yi, W. Lee, **J. Moon**, "NPL.H: Neutral-Point-Less H-Type 3-Level Inverter," in *IEEE Transactions on Power Electronics*, Feb. 2024.
7. J. Chen, S. Jun, S. Hong, W. He, **J. Moon**, "Eciton: Very Low-Power Recurrent Neural Network Accelerator for Real-Time Inference at the Edge," in *ACM Transactions on Reconfigurable Technology and Systems*, Nov. 2023.

8. L. Yi, **J. Moon**, “A Double-sided LC-Compensated Capacitive Wireless Power Transfer System with Admittance-based Matching Networks,” in *Journal of Power Electronics*, Dec. 2023.
9. L. Yi, M. McTigue, D. Gines, B. Doerr, **J. Moon**, "Minimally Invasive Direct *In-Situ* Magnetic Loss Measurement in Power Electronic Circuits," in *IEEE Transactions on Power Electronics*, vol. 38, no. 11, pp. 14334-14344, Nov. 2023.
10. M. Gao, L. Yi, **J. Moon**, "Mathematical Modeling and Validation of Saturating and Clampable Cascaded Magnetics for Magnetic Energy Harvesting," in *IEEE Transactions on Power Electronics*, Oct. 2022.
11. L. Yi, **J. Moon**, "Bidirectional Q-Z-Source DC Circuit Breaker," in *IEEE Transactions on Power Electronics*, vol. 37, no. 8, pp. 9524-9538, Aug. 2022.
12. L. Yi, **J. Moon**, "*In Situ* Direct Magnetic Loss Measurement With Improved Accuracy for Lossier Magnetics," in *IEEE Transactions on Instrumentation and Measurement*, vol. 71, pp. 1-14, 2022.
13. **J. Moon**, "High-frequency capacitive wireless power transfer technologies," in *Journal of Power Electronics*, vol. 21, pp. 1243-1257, Aug. 2021.
14. N. Wang, H. Wang, J. Mei, S. Mohammadi, **J. Moon**, J. Lang, J. Kirtley, "Robust 3-D Wireless Power Transfer System Based on Rotating Fields for Multi-User Charging," *in IEEE Transactions on Energy Conversion*, vol. 36, no. 2, pp. 693-702, Jun. 2021.
15. L. Yi, **J. Moon**, "Direct *in-situ* Measurement of Magnetic Loss in Power Electronic Circuits," in *IEEE Transactions on Power Electronics*, vol. 36, no. 3, pp. 3247-3257, Mar. 2021.
16. S. Kim, K. Park, N. Son, **J. Moon**, H. Park, K. Kim, J. Park, J. Lee, "Application of Impulse Oscillometry in Adult Asthma Patients with Preserved Lung Function," in *Allergy, Asthma and Immunology Research*, vol. 12, no. 5, pp. 832-843, Sep. 2020.
17. **J. Moon**, S. Leeb, “Wire Less Sensors for Electromechanical Systems Diagnostics,” in *IEEE Transactions on Instrumentation and Measurement*, vol. 67, no. 9, pp. 2235-2246, Sep. 2018.
18. C. Schantz, K. Gerhard, J. Donnal, **J. Moon**, B. Sievenpiper, S. Leeb, K. Thomas, “Retrofittable Machine Condition and Structural Excitation Monitoring from the Terminal Box,” in *IEEE Sensors Journal*, vol. 16, no. 5, pp. 1224-1232, Mar. 2016.
19. **J. Moon**, S. Leeb, “Power Electronic Circuits for Magnetic Energy Harvesters,” in *IEEE Transactions on Power Electronics*, vol. 31, no. 1, pp. 270-279, Jan. 2016.
20. **J. Moon**, S. Leeb, “Analysis Model for Magnetic Energy Harvesters,” in *IEEE Transactions on Power Electronics*, vol. 30, no. 8, pp. 4302-4311, Aug. 2015.

MAGAZINE ARTICLES

J. Moon, "A New Approach to Energy Efficient Maintenance: Condition-based Maintenance," in SK Hynix Newsroom, Sep. 2021.

J. Moon, "Beyond GPS: Exploring Positioning Technology through Artificial Intelligence," in SK Hynix Newsroom, Feb. 2021.

J. Moon, "Recent Trends in Capacitive Wireless Power Transfer," in The Korean Institute of Power Electronics Magazine, Jun. 2019. (Article written in Korean)

CONFERENCE PROCEEDINGS

1. M. Gao, L. Yi, **J. Moon**, "Improving Magnetic Energy Harvesting via Desaturation with Reverse Voltage," *2024 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Long Beach, CA, USA, 2024.
2. L. Yi, **J. Moon**, "Direct *In-situ* Measurement of Magnetic Core Loss Under Rectangular Voltage Excitation in Power Electronic Circuits," *2024 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Long Beach, CA, USA, 2024.
3. K. Lee, M. Benson, X. Dong, **J. Moon** and W. Lee, "Common-Mode EMI Noise Analysis of Neutral-Point-Less (NPL) Multilevel X-Type Inverter," *2024 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Long Beach, CA, USA, 2024.
4. H. Jalloul, A. Alshami, N. Nickdoost, **J. Moon**, J. Choi, "Automated Material Separation Activity Identification for Sustainable Demolition Operations," *Construction Research Congress 2024*, Des Moines, IA, USA, Mar. 2024.
5. L. Yi, **J. Moon**, "An LC/LCLC Compensated Capacitive Wireless Power Transfer System for Constant Current Output," *2023 IEEE Energy Conversion Congress & Expo (ECCE)*, Nashville, TN, US, 2023.
6. M. Benson, X. Dong, K. Lee, **J. Moon**, W. Lee, "Neutral-Point-Less (NPL) Multilevel Inverter with Discontinuous Pulse Width Modulations: X-type Inverter," *2023 IEEE Energy Conversion Congress & Expo (ECCE)*, Nashville, TN, USA, 2023.
7. M. Gao, H. L. Herrera and **J. Moon**, "Optimization of Core Size and Harvested Power for Magnetic Energy Harvesters based on Cascaded Magnetics," *2023 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Orlando, FL, USA, 2023, pp. 2926-2932.
8. K. Lee, M. Benson, M. Fereydoonian, X. Dong, **J. Moon** and W. Lee, "Comprehensive Electromagnetic Interference Analysis of Neutral-Point-Less (NPL) Multilevel Inverter with Active Common-Mode Voltage Cancellation," *2023 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Orlando, FL, USA, 2023, pp. 237-243.
9. M. Benson, X. Dong, M. Guven, K. Lee, **J. Moon**, W. Lee, "Efficiency and DC-link Ripple Analysis of Neutral-Point-Less (NPL) Multilevel Inverter with Discontinuous Pulse Width Modulations," *2022 IEEE Energy Conversion Congress and Exposition (ECCE)*, Oct. 2022.
10. M. Gao, L. Yi, **J. Moon**, "Analysis, Modeling, and Validation of Cascaded Magnetics for Magnetic Energy Harvesting," *2022 IEEE Energy Conversion Congress and Exposition (ECCE)*, Oct. 2022.
11. D. Han, S. Kim, X. Dong, H. Li, **J. Moon**, Y. Li, F. Peng, "An Integrated Multi-level Active Gate Driver for SiC Power Modules," *IEEE Transportation Electrification Conference & Expo (ITEC),* Jun. 2022.
12. M. Guven, M. Benson, X. Dong, **J. Moon**, W. Lee, "Operating Principle of Neutral-Point-Less (NPL) Multilevel Inverter Topology: X-type Inverter*," IEEE Transportation Electrification Conference & Expo (ITEC)*, Jun. 2022.
13. M. Benson, X. Dong, M. Guven, K. Lee, **J. Moon**, W. Lee, "Neutral-Point-Less (NPL) Multilevel Inverter Topology with Single DC-link Capacitor: H-type Inverter," *IEEE Transportation Electrification Conference & Expo (ITEC)*, Jun. 2022.
14. X. Dong, H. Li, S. Martin, S. Kim, D. Han, F. Peng, **J. Moon**, Y. Li, M. Chinthavali, R. Moorthy, "SiC-Based Intelligent Power Stage with Device Prognosis & Diagnosis and ZVRT Capability," *2022 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Mar. 2022.
15. D. Han, S. Kim, X. Dong, Z. Guo, H. Li, **J. Moon**, Y. Li, F. Peng, "An Integrated Active Gate Driver for Half-bridge SiC MOSFET Power Modules," *2022 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Mar. 2022.

16. D. Han, S. Kim, X. Dong, Z. Guo, H. Li, **J. Moon**, Y. Li, F. Peng, R. Moorthy, M. Chinthavali, "An Integrated Active Gate Driver for SiC MOSFETs," *IEEE Workshop on Wide Bandgap Power Devices and Applications (WiPDA)*, Nov. 2021.
17. S. Kim, D. Han, X. Dong, H. Li, **J. Moon**, Y. Li, F. Peng, "An Intelligent Gate Driver With Self-diagnosis and Prognosis for SiC MOSFETs," *2021 IEEE Energy Conversion Congress and Exposition (ECCE)*, Oct. 2021.
18. J. Chen, S. Hong, W. He, **J. Moon**, S. Jun, "Eciton: Very Low-Power LSTM Neural Network Accelerator for Predictive Maintenance at the Edge," *International Conference on Field-Programmable Logic and Applications (FPL)*, Sep. 2021. **(Best Paper Award)**
19. L. Yi, **J. Moon**, "Design of Efficient Double-Sided LC Matching Networks for Capacitive Wireless Power Transfer System," *IEEE PELS Workshop on Emerging Technologies: Wireless Power Transfer (WoW)*, Jun. 2021.
20. S. Kang, **J. Moon**, S. Jun, "FPGA-Accelerated Time Series Mining on Low-Power IoT Devices," *IEEE Application-specific Systems, Architectures and Processors (ASAP)*, Jul. 2020.
21. L. Yi, **J. Moon**, "Novel Methods for *In-situ* Direct Magnetic Loss Measurement in a DC-DC Converter," *2020 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Mar. 2020.
22. S. Kim, K. Kim, **J. Moon**, S. Lee, K. Park, J. Lee, J. Park, "Application of Impulse Oscillometry to Adult Asthma with Preserved Lung Function," *The 128th Congress of the Korean Academy of Tuberculosis and Respiratory Diseases (KATRD)*, Nov. 2019. **(Best Abstract Award)**
23. **J. Moon**, "*In-situ* Direct Magnetic Loss Measurement in a DC-DC Converter," *2019 IEEE Energy Conversion Congress and Exposition (ECCE)*, Oct. 2019.
24. J. Donnal, C. Schantz, **J. Moon**, P. Lindahl, S. Leeb, "Stethoscopes for Nonintrusive Monitoring," *IEEE Sensors Applications Symposium (SAS)*, Mar. 2017
25. **J. Moon**, P. Lindahl, J. Donnal, S. Leeb, "A Nonintrusive Magnetically Self-Powered Vibration Sensor for Automated Condition Monitoring of Electromechanical Machines," *IEEE AUTOTESTCON*, Sep. 2016.
26. **J. Moon**, S. Leeb, "Enhancement on Energy Extraction from Magnetic Energy Harvesters," *2015 IEEE Energy Conversion Congress and Exposition (ECCE)*, Sep. 2015.
27. **J. Moon**, S. Leeb, "Power Loss Analysis with High Primary Current in Magnetic Energy Harvesters," *2015 IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Jul. 2015.
28. **J. Moon**, S. Leeb, "Power Flow Control and Regulation Circuits for Magnetic Energy Harvesters," *2014 IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Jun. 2014.
29. **J. Moon**, J. Donnal, J. Paris, S. Leeb, "VAMPIRE: A Magnetically Self-Powered Sensor Node Capable of Wireless Transmission," *2013 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Mar. 2013.
30. J. Donnal, U. Orji, C. Schantz, **J. Moon**, S. Leeb, "VAMPIRE: Accessing a Life-Blood of Information for Maintenance and Damage Assessment," *Proceedings of American Society of Naval Engineers (ASNE)*, Feb. 2012.
31. Y. Kim, J. Jang, **J. Moon**, S. Lee, D. Kwon, H. Choi, G. Park, B. Chung, "High-PSRR All-Digital Delay Locked Loop with Burst Update Mode and Power Noise Damping Scheme," *IEEE Symposium on VLSI Circuits (VLSIC)*, Jun. 2011.
32. **J. Moon**, J. Kih, "Fast Parallel CRC & DBI Calculation for High-speed Memories: GDDR5 and DDR4," *IEEE International Symposium on Circuits and Systems (ISCAS)*, May. 2011.
33. **J. Moon**, H. Lee, "A Dual-Loop Delay Locked Loop with Multi Digital Delay Lines for GHz DRAMs,"

IEEE International Symposium on Circuits and Systems (ISCAS), May. 2011.

34. **J. Moon**, B. Chung, "Sense Amplifier with Offset Mismatch Calibration for Sub 1-V DRAM Core Operation," *IEEE International Symposium on Circuits and Systems (ISCAS)*, May. 2010.

PATENTS AND INVENTION DISCLOSURES

1. "Spike Absorbing Energy Harvester for MVDC and HVDC," Oct. 2023.
2. "Magnetic Core Desaturation Methods for Magnetic Energy Harvesting," Oct. 2023.
3. "Dual Multilevel Inverter Topology with Reduced Switch Count and Small DC-Link Cap" Dec. 2021.
4. "Non-Intrusive, *In-Situ* Power Measurement Method," Dec. 2021.
5. "Non-intrusive Monitoring," Apr. 2014.
6. "A Burst Ordering Circuit for DRAM Device," Oct. 2010.
7. "Parallel CRC and DBI Generation Circuits for High-speed DRAM Device," Jun. 2010.
8. "Testing Circuits for DDR SDRAM devices," May. 2010.
9. "10-ui Data Frame Control with 4-Phase Clocking," Oct. 2009.
10. "Dual MRS and Dual MPR for Faster MPR Response," Sep. 2009.
11. "Data Mask Control through DRAM MRS," Jul. 2009.
12. "DRAM Device Capable of Gapless Transfer While in Gear Down Mode," Jul. 2009. **(Patent Award)**
13. "Sync Pulse Generation & Feedback for DDR4 SDRAM Gear Down Mode," Jul. 2009.
14. "Data Read on High-speed DRAM," May. 2009.
15. "Memory Device with an Offset Cancellation Sense Amplifier," Mar. 2009.
16. "6-Transistor Robust XOR Gate for Low Voltage Circuits," Feb. 2009.
17. "Voltage Reference Generator with Higher Supply Rejection," Sep. 2008.

HONORS & PRIZES

2021 **Best Paper Award**, *FPL*

2019 **Best Abstract Award**, *KATRD*

2014 **U.S. Department of Energy Grand Prize**, *MIT CEP*

NSTAR Grand Prize, *MIT CEP*

Energy Track Winner, *MIT $100K Competition*

MIT EECS Teaching Award

2011 **Kwanjeong Foundation Fellowship**

2009 **Hynix Strategic Patent Award**

INVITED TALKS

2024 **University of Rhode Island**, *Power Electronic Circuit Designs*

Starfire Industries, *Power Electronics Research: Magnetics & Transportation Electrification & Zs-DCCB*

2023 **IEEE ECCE 2023 Tutorial Session**, *Z-source DC Solid-State Circuit Breakers (T11)*

Michigan State University, *Precision In-situ Magnetic Loss Measurement for Power Converters*

Korea Electrotechnology Research Institute, *Z-source DC Circuit Breaker*

Korean Institute of Power Electronics, *High-perf. Current Meas. for General Power Electronics*

2021 **Korean Institute of Power Electronics**, *Direct* In-situ *Magnetic Loss Measure. for Power Converters*

Keysight Technologies, *Direct In-situ Magnetic Loss Measurement for Power Converters*

2019 **State of Florida Department of Transportation**, *Energy Harvesting & Resilient Power Electronics*

Seoul National University, *Electromagnetic Energy Harvesting and Self-powered Embedded Systems*

Jeonju University, *Electromagnetic Energy Harvesting and Self-powered Embedded Systems*

Jeonbuk National Univ, *Electromagnetic Energy Harvesting and Self-powered Embedded Systems*

2018 **Florida State University**, *Electromagnetic Energy Harvesting and Self-powered Embedded Systems*

2016 **LG Electronics**, *Electromagnetic Energy Harvesting and Self-powered Embedded Systems*

Maxim Integrated, *Electromagnetic Energy Harvesting and Self-powered Embedded Systems*

Apple, *High-speed DRAM and Low-power Implementation of Data Bus Inversion*

Pi Charging, *Electromagnetic Energy Harvesting and Self-powered Embedded Systems*

2015 **Microsoft**, *Electromagnetic Energy Harvesting and Self-powered Embedded Systems*

TEACHING

FAMU-FSU College of Engineering — Tallahassee, FL

EEL5930 – Advanced Power Electronics — Fall 19/22/23
EEE4301 – Electronics 2 — Spring 21/22/23/24
EEL3112 – Circuits 2 — Spring 20, Fall 20/21/22/23
EEL6932 – ECE Graduate Seminar — Spring 21/22, Fall 21

Massachusetts Institute of Technology (MIT) — Cambridge, MA

6.131 – Power Electronics Laboratory — Fall 2013/2014

STUDENT ADVISING

Ph.D. Students

Chandika Kiriella (Ph.D. Program)		Spring 2024 – Current
Hebert Lopez (Ph.D. Program)		Spring 2022 – Spring 2023
Xiaofeng Dong (Ph.D. Program, Co-advisee)	(Graduated)	Spring 2020 – Spring 2022
Min Gao (Ph.D. Program)		Spring 2020 – Current
Lifang Yi (Ph.D. Program)	(Graduated)	Fall 2019 – Fall 2023

M.S. Students

Diego Campos (M.S. Program)	(Graduated)	Fall 2020 – Spring 2022
Yueqi Huang (M.S. Program)	(Graduated)	Spring 2019 – Fall 2019

Undergraduate Students

Jeffery Thomas Jr.
Stephanie Dumanoir
Evan Cloutier
Victor Tovar
Jose Hernandez
Angel Salges Valoz
Patrick Hollis
Andrew Poirier
Elijah Parsanko
Zachary Noay

K-12 Students

Cornerstone Middle School Solar Car Team (Florida State-level Competition) — Spring 2022

Ph.D. Thesis Committee

Chandika Kiriella / Xuli Quan / Ashish Bhardwaj / Rami Yehia /
Hamed Pourgharibshahi / Ahmed Abdelhadi / Dongwoo Han / Xiaofeng Dong /
Lifang Yi / Min Gao / Hebert Lopez / Hector Akuta / Zhehui Guo / Yu Zhang

M.S. Thesis Committee

Diego Campos / Yueqi Huang

PROFESSIONAL SERVICES

2019– **Associate Editor,** *Journal of Power Electronics*
2019– **Publication Liaison,** *IEEE PELS Technical Committee 1*
2019– **Committee Member,** *IEEE PELS Digital Media and Education Committee*
2023–2023 **Vice Chair,** *IEEE ECCE 2023*
2023–2023 **Technical Committee,** *IEEE COMPEL 2023*
2021–2021 **Publicity Chair,** *IEEE Wireless Power Week 2021*
2007–2011 **Participating Member,** *JEDEC DDR4 SDRAM Spec Standardization on Functions & Features*

Journal Reviewer, *IEEE TPEL, JESTPE, TIE, TPD, IoTJ, PEM, Journal of Power Electronics*
Conference Reviewer, *IEEE APEC, ECCE, COMPEL, WoW, ISCAS*