Abbreviated Curriculum Vitae

Daryl Beetner

Education:

1997 D.Sc. Electrical Engineering, Washington University at St Louis

1994 M.S. Electrical Engineering, Washington University at St Louis

1990 B.S. Electrical Engineering, Southern Illinois University at Edwardsville

Employment:

2020-present **Director**, NSF Center for Electromagnetic Compatibility (an NSF IUCRC)
(Ranked among top 5 of NSF's ~75 IUCRCs – highest income, 2nd largest number of industry members, 4th largest number of PhDs, 4th largest number of publications. Industry partners include Cisco, Apple, Google, IBM, Intel, Amazon, and many others).

2020-present **Director**, Missouri S&T Electromagnetic Compatibility Laboratory
(A >$10M laboratory of ~50 people generating over $2M/year in expenditures)

2010-present **Professor** of Electrical and Computer Engineering
Missouri University of Science and Technology

2014-2020 **Chair** of Electrical and Computer Engineering
Missouri University of Science and Technology.

2006-2009 **Assoc. Chair** for Computer Engineering
Missouri University of Science and Technology

2004-2010 **Assoc. Professor** of Electrical and Computer Engineering
Missouri University of Science and Technology

1998-2004 **Assistant Professor** of Electrical and Computer Engineering
University of Missouri – Rolla

Selected Honors and Awards:

- IEEE Fellow, 2024 (*available to no more than 1 out of 1000 IEEE members per year*).
- 2024 Risaburo Sato Award for the best overall paper presented at the 2024 EMC Japan/APEMC Conference (*More than 200 papers presented*).
- IEEE St. Louis Section award for Outstanding Research and Scholarship, 2024 *(1 award annually)*
- IEEE EMC Society Technical Achievement Award, 2020 (*Typically 1-3 given each year, internationally)*
- Richard B. Schulz Best Transaction Paper award, IEEE Transactions on EMC, Honorable Mention, 2018 (*1 award and 1 honorable mention given out of >200 papers/year)*
- Many best paper/best student paper awards/finalists (EMC+SIPI Symposium: two in 2024, two in 2023, four in 2022, 2021, 2008; DesignCon: 2008, 2015; EOSESD: 2017, 2022; APEMC: 2024)
- Adjunct Faculty, Indian Institute of Technology – Roorkee, 2024
- Missouri S&T Faculty Research Award, 2024 (*for exceptional research performance).*
- Missouri S&T Faculty Excellence Award, 2021, 2008, 2003 (*for exceptional performance in all areas of faculty activity: teaching, research, and service*).

- Missouri S&T Outstanding Faculty award from the Staff Council, 2021 (*Inaugural recipient. For exceptional support of S&T staff*).
- Missouri S&T award for Excellence in Teaching, Research, and Service at post-tenure review, 2019.

Recent Honors and Awards by Advised Students:

2024 D. Szanto, 1st place, Academic poster/presentation competition, SIMULIA Americas Users Conference, 2024

2024 A. Harmon, IEEE EMC Society James C. Klouda Memorial Scholarship Award

2024 A. Harmon, 2nd place, 2024 EMC Society International Student EMC Hardware Design Contest

2024 A. Harmon, finalist, Best EMC Paper, 2024 EMC+SIPI Symposium

2024 Z. Peng, finalist, Best EMC paper, 2024 EMC+SIPI Symposium

2024 Z. Peng, finalist, Best student EMC paper, 2024 EMC + SIPI Symposium

2023 G. Tsinstadze, 2023 EMC Society International Student EMC Hardware Design Contest

2023 C. Goins, IEEE EMC Society James C. Klouda Memorial Scholarship Award

2022 F. Ma, Honorable mention, Best Student EMC Paper, 2022 EMC+SIPI Symposium.

2022 Y. Xu, Finalist, Best Student EMC Paper, 2022 EMC+SIPI Symposium.

2022 Z. Sun, Finalist, Best Student SIPI Paper, 2022 EMC+SIPI Symposium.

2021 Y. Xu, Best Student Paper Presentation, IEEE International Symposium on EMC and SIPI

2021 Y. Xu, Best Student Paper finalist, IEEE International Symposium on EMC and SIPI

2019 S. Marathe, Best Student Paper finalist, IEEE International Symposium on EMC and SIPI

2017 A. Patnaik, Best Student Paper Award, 39th Electrical Overstress/Electrostatic Discharge Symposium, 2017.

Publications:

Journal articles: 73 *(23 in last 5 years)*
Conference articles: 140 *(53 in last 5 years)*
Books/book chapters: 2
Patents/invention disclosures: 5

Recent Refereed Journal Articles

X. Yan, W. Zhang, S. Sadeghi, M. Gholizadeh, D. Pommerenke, D. Beetner, "Mechanisms for Unwanted Magnetic Field Coupling to a Shielded Magnetic Near-Field Probe," IEEE Transactions on Signal and Power Integrity, *to appear. Available in IEEE Xplore*.

H. Rezaei, M. Soerensen, K. Jensen, D. Pommerenke, D. Beetner, "Influence of Variations in Imbalanced LISN Termination Impedances on Radiated Emissions," IEEE Transactions on Instrumentation and Measurement, IEEE Transactions on Instrumentation and Measurement, Vol. 74, 2025.

A. Harmon, J. Hunter, C. Goins, A. Hassan, V. Khilkevich, D. Beetner, “Measuring and Modeling the Conducted Susceptibility of an Integrated Circuit Pin to High-Frequency RF Waveforms,” Journal of Directed Energy (limited edition), Vol. 5, 2024

Z. Sun, J. Liu, X. Xiong, D. Kim, D. Beetner, V. Khilkevich, “Extraction of Transmission Line Surface Roughness Using S-Parameter Measurements and Cross-Sectional information,” IEEE Transactions on Signal and Power Integrity, Vol. 3, 2024

X. Yan, J. Li, W. Zhang, K. Ghosh, P. Sochoux, D. Beetner, V. Khilkevich, “Microwave Holography for EMI Source Imaging,” IEEE Transactions on Electromagnetic Compatibility, Vol. 66, No. 2, 2024.

S. Xia, J. Hunter, A. Harmon, A. Hassan, V. Khilkevich, D. Beetner, “A Segmentation Approach for Predicting Plane Wave Coupling to PCB Structures,” IEEE Transactions on Electromagnetic Compatibility, Vol. 66, No. 2, 2024

Z. Sun, J. Liu, X. Xiong, D. Kim, D. Beetner, V. Khilkevich, “Characterization of A Microstrip Line Referenced to A Meshed Return Plan Using 2D analysis,” IEEE Transaction on Signal and Power Integrity, Vol. 3, pp. 13-20, 2024.

X. Yan, S. M. Mousavi, L. Shen, Y. Xu, W. Zhang, S. Bub, S. Holland, D. Beetner, “A Physics-Based Model for Snapback Type ESD Protection Devices,” IEEE Transaction on Electromagnetic Compatibility, Vol. 65, No. 5, pp. 1273-1281, 2023.

J. Li, B. Lin, Y. Qi, J. L. Drewniak, J. Zhu and D. G. Beetner, "Wideband Inverse Matrix for Radiated Two-Stage MIMO Measurements," IEEE Transactions on Antennas and Propagation, Vol. 71, No. 8, 2023.

X. Yan, J. Zhang, S. Wu, M.F. Xue, C. K. Leung, E. MacIntosh, D. G. Beetner, "A Methodology for Predicting Acoustic Noise From Singing Capacitors in Mobile Devices," IEEE Transactions on Electromagnetic Compatibility, vol. 65, no. 4, 2023.

H. Rezaei, D. Pommerenke, D. Beetner, “A Methodology for Predicting Improved Dipole Source Configurations from Near-Field Scan Data,” IEEE Transactions on Electromagnetic Compatibility, vol. 65, no. 5, 2023.

P. Shen, Q. Yu, D. Beetner, Y. Qi, “A Throughput Fast Measurement Method for Two-antenna Equipped Wireless MIMO Terminals,” IEEE Transactions on Instrumentation and Measurement, vol. 72, pp. 1-8, 2023.

S. Penugonda, S. Bai, V. Sanphhuang, N. Altunyurt, H. Kim, D. Beetner, J. Fan, “Three-Terminal Noise Source Extraction From a Qi-Based Wireless Power Transfer System for Predicting Conducted Emissions,” IEEE Transactions on Electromagnetic Compatibility, Vol. 65, No. 5, pp. 1548-1555, 2023.

W. Zhang, J. Meiguni, Y. Sun, M. Ouyang, X. Wang, R. Yazdani, D. Beetner, D. Pommerenke, “Electromagnetic Transmit Array With Optical Control for Beamforming,” IEEE Transactions on Antennas and Propagation, vol. 71, no. 6, pp. 5481-5486, 2023.

Y. Xu, J. Zhou, S. Bub, S. Holland, J. Meiguni, D. Pommerenke, D. Beetner, “Improved SEED Modeling of an ESD Discharge to a USB Cable,” IEEE Transactions on Electromagnetic Compatibility, Vol. 65, no. 6, pp. 625-33, 2023.

Z. Peng, Y. Xu, M. Yea, S. Bub, S. Holland, D. Kim, D. Pommerenke, D. Beetner, "Characterization and Modeling of Commercial ICs for System-Efficient ESD Design," in IEEE Transactions on Electromagnetic Compatibility, vol. 64, no. 6, pp. 1802-1811, Dec. 2022

J. Zhou, Y. Xu, S. Bub, S. Holland, J. Meiguni, D. Pommerenke, D. Beetner, "Transient Response of ESD Protection Devices for a High-Speed I/O Interface," in IEEE Transactions on Electromagnetic Compatibility, vol. 64, no. 4, pp. 907-14, 2022.

M. Z. M. Hamdalla, B. Bissen, J. Hunter, Y. Liu, V. Khilkevich, D. Beetner, A. Caruso, A. Hassan, "Characteristic Mode Analysis Prediction and Guidance of Electromagnetic Coupling Measurements to a UAV Model," in IEEE Access, vol. 10, pp. 914-925, 2022, doi: 10.1109/ACCESS.2021.3138296.

H. Rezaei, M. Sørensen, W. Huang, D. G. Beetner and D. Pommerenke, "Analyzing the Influence of Imbalanced Two- or Three-Wire VHF LISN on Radiated Emissions from AC Cables," IEEE Transactions on EMC, vol. 64, no. 2, pp. 327-37, 2022

J. Meiguni, J. Zhou, G. Maghlakelidze, Y. Xu, O. Hoseini, S. Marathe, L. Shen, S. Bub, S. Holland, D. Beetner, D. Pommerenke, "Transient Analysis of ESD Protection Circuits for High-Speed ICs," IEEE Transactions on EMC, 2021, vol. 63, no. 5, pp. 1312-1321, Oct. 2021. (**Selected as one of four "Exemplary Papers" from EMC Transactions to appear at 2023 IEEE EMC+SIPI Symposium)**

T. Makharashvili, S. Bai, G. Maghlakelidze, S. Connor, A. Ruehli, P. Berger, J. Drewniak, D. Beetner, "Accurate Inductance Models of Mounted Two-Terminal Decoupling Capacitors," IEEE Transactions on EMC, vol. 63, no. 1, 2021.

H. Rezaei, J. Meiguini, M. Soerensen, R. Jobava, V. Khilkevich, J. Fan, D. Beetner, D. Pommerenke, "Source Reconstruction in Near Field Scanning using Inverse MoM for RFI Application," IEEE Transactions on EMC, vol. 62, no. 4, pp. 1628-36, 2020.

S. Marathe, A. Patnaik, R. Mi, K. Ghosh, J. Kim, D. Pommerenke, D. Beetner, "Measurement-based Validation of Integrated Circuit Transient Electromagnetic Event Sensors," IEEE Transactions on EMC, vol. 62, no. 4, pp. 1555-1562, 2020.

T. Makharashvili, S. Bai, S. Connor, A. Ruehli, P. Berger, J. Drewniak, D. Beetner, "Circuit Models for the Inductance of 8-Terminal Decoupling Capacitors," IEEE Transactions on Components, Packaging and Manufacturing Technology, vol. 10, no. 1, 2020.

N. Bondarenko, M. Koledintseva, P. Shao, P. Berger, D. Pommerenke, D. Beetner, "Common-mode Impedance of a Ferrite Toroid on a Cable Harness," Progress in Electromagnetic Research C, vol. 88, pp. 27-41, 2018.

T. Schulze, D. Beetner, Y. Shi, K. Kwiat and C. Kamhoua, "Combating Data Leakage Trojans in Commercial and ASIC Applications with Time Division Multiplexing and Random Encoding,", IEEE Transactions on Very Large Scale Integration Systems, vol. 26, no. 10, pp. 2007-15, 2018.

A. Patnaik, S. Marathe, S. Liu, D. Pommerenke, and D. Beetner, "A Transient Event Sensor for Efficient System Level ESD Testing," IEEE Transactions on Electromagnetic Compatibility, vol. 60, no. 5, pp. 1231-1239, 2018. **Best Paper in IEEE Transactions on EMC in 2018, honorable mention.**

L. Ren; S. Sun; M. Deo; J. Jaffari; P. Anmula; P. Boyle; J. L. Drewniak; D. G. Beetner, "A Vectorless Approach for Predicting Switching Activity in a Digital Circuit," in IEEE Transactions on Electromagnetic Compatibility, vol. 58, no. 3, 2016. (**An IEEE T-EMC top-10 download for 2016**)

C. Sui, L. Ren, X. Gao, J. Pan, J. L. Drewniak and D. G. Beetner, "Predicting Statistical Characteristics of Jitter Due to Simultaneous Switching Noise," in IEEE Transactions on Electromagnetic Compatibility, vol. 58, no. 1, pp. 249-256, Feb. 2016.

L. Ren, T. Li, S. Chandra, X. Chen, H. Bishnoi, S. Sun, P. Boyle, I. Zamek, J. Fan, D. Beetner, J. Drewniak, "Prediction of Power Supply Noise from Switching Activity in an FPGA," IEEE Transactions on Electromagnetic Compatibility, Vol. 56, No. 3, pp. 699-706, 2014. **(IEEE TEMC Top 10 downloaded papers for 2014)**

Recent Refereed Conference Papers

M. Lindboe, R. Hunt, M. Hamdalla, J. McGeehan, A. Caruso, D. Beetner, A. Hassan, "A Reference Setup for Replicability in High-Power Electromagnetic Effects," Annual Directed Energy Systems Symposium, 2024

Z. Peng, J. Zhou, D. Kostka, D. Pommerenke, D. Beetner, "Dust Figure Guided Modeling of Corona Discharge on Touchscreen Surface," Japan EMC / Asia-Pacific EMC Symposium, 2024 (**2024 Risaburo Sato Award for the best overall paper**, **out of ~200 presented**).

D. Szanto, S. Mousavi, S. Mousavi, D. Pommerenke, D. Beetner, "CST Implementation of TVS Models for Use in Transient Co-Simulation," SIMULIA Americas Users Conference, 2024 (**1st place, Academic poster competition**).

C. Goins, A. Harmon, M. Starkey, D. Szanto, J. McGeehan, A. Hassan, V. Khilkevich, D. Beetner, "Device-Level Modeling and Characterization for Prediction of System-Level Susceptibility," Annual Directed Energy Science & Technology Symposium, 2024

A. Harmon, D. Szanto, V. Khilkevich, D. Beetner, "The Feasibility of a Direct Injection Probe with a Capacitively Coupled Return and Integrated Voltage Monitor," Annual Directed Energy Science & Technology Symposium, 2024

M. Starkey, V. Khilkevich, D. Beetner, "Locating Components Responsible for Radiated Susceptibilities Using a Mode Stirred Tent," Annual Directed Energy Science & Technology Symposium, 2024

A. Harmon, C. Goins, M. Starkey, D. Szanto, R. Hunt, M. Lindboe, J. McGeehan, D. Hassan, V. Khilkevich, D. Beetner, "Statistical Prediction of Near-Optimal HPEM Waveforms for Unknown PCB Targets," 2024 DE Systems Symposium, 2024

M. Hamdalla, R. Hunt, M. Lindboe, J. McGeehan, A. Caruso, D. Beetner, and A. M Hassan, "Prediction of Electromagnetic Coupling to Complex Targets Using a Hybrid Computational/Experimental Equivalent Circuit Co-Characterization Methodology," 2024 Directed Energy Systems Symposium, Monterey, CA, USA, 2024.

J. McGeehan, A. M. Hassan, and D. Beetner, "Addressing the Field of Uncertainty: Predicting the Most Effective Agile Waveform for RF Attack," 2024 Directed Energy Systems Symposium, Monterey, CA, USA, 2024.

A. M. Hassan, M. Z. M. Hamdalla, D. Beetner, V. Khilkevich, J. McGeehan, "HPEM Waveform Shaping for Targets with Quantifiable Uncertainty: The Worst-Case Approach," 2024 Annual Directed Energy Science and Technology Symposium, Colorado Springs, CO, USA, 2024.

R. Hunt, D. Beetner, V. Khilkevich, J. McGeehan, J. Willits, A. Caruso, A. Hassan, and M. Hamdalla, "Experimental Verification of Worst-Case Waveform Coupling to a Loaded System," 2024 International Applied Computational Electromagnetics Society Symposium (ACES), 2024

A. Harmon, D. Szanto, V. Khilkevich, D. Beetner, "On the Feasibility of a Direct Injection Probe with a Capacitively Coupled Return and Integrated Voltage Monitor, IEEE EMC+SIPI Symposium, 2024 (**Finalist, best EMC paper, out of roughly 100 papers in area**).

G. Tsintsadze, H. Manoharan, A. Sahai, B. Booth, D. Beetner, "Evaluating Electromagnetic Interference Effects on GNSS Receivers," IEEE EMC+SIPI Symposium, 2024.

H. Zhang, D. Beetner, "An Equivalent Coil Model of a Wireless Power Transfer System Including Eddy Loss," 2024 IEEE International Symposium on Electromagnetic Compatibility, Signal & Power Integrity (EMC+SIPI), 2024.

S. Xia, V. Khilkevich, D. Beetner, "Statistical Analysis of Electromagnetic Coupling to Printed Circuit Boards," 2024 IEEE International Symposium on Electromagnetic Compatibility, Signal & Power Integrity (EMC+SIPI), 2024.

Z. Peng, J. Zhou, D. Kostka, D. Pommerenke, D. Beetner, "A Model for Corona Streamer Propagation on Glass during an Air Discharge," IEEE EMC+SIPI Symposium, 2024 (**Finalist, best EMC paper, out of roughly 100 papers in area; Finalist, best student EMC paper; Selected by EOSESD Association as one of 2024's most significant papers**).

S. Mousavi, X. Yan, R. Asadi, M. Mousavi, S. Bub, S. Holland, D. Beetner, "A Physics-Based Model for ESD Protection Devices with Open Base BJT Configuration," 2024 46th Annual EOS/ESD Symposium (EOS/ESD), 2024.

X. Yan, S. Mousavi, L. Shen, Y. Xu, W. Zhang, S. Bub, S. Holland, D. Pommerenke, D. Beetner, "A Combined Model for Transient and Self-Heating of Snapback Type ESD Protection Devices," 2023 45th Annual EOS/ESD Symposium (EOS/ESD), 2023.

Z. Sun, J. Liu, X. Xiong, Y. Liu, V. Khilkevich, D. Kim, D. Beetner, "Modeling of a Microstrip Line Referenced to a Meshed Return Plane," 2023 EMC+SIPSI Symposium, 2023.

J. Zhou, C. Lam, Z. Peng, D. Beetner, D. Pommerenke, "Characterization and Modeling of Sparkless Discharge to a Touch Screen Display," 2023 EMC+SIPSI Symposium, 2023.

M. Mathew, X. Yan, Y. Guo, T. Fokkens, L. Shen, D. Beetner, D. Kim, "Analysis and Modeling Framework of Common Mode Noise in a Three-phase Motor System," Asia-Pacific EMC Symposium, 2023.

C. Goins, A. Harmon, V. Khilkevich, D. Beetner, "Design and Construction of an Arbitrary Pulse Compressive Amplifier," 2023 EMC+SIPSI Symposium, 2023.

S. Mousavi, E. Tauber, A. Pak, D. Pommerenke, D. Beetner, "ESD Behavior of RF Switches and Importance of System Efficient ESD Design," 2023 EMC+SIPSI Symposium, 2023. **(Selected by EOS/ESD Society for special invited re-presentation to the 2024 EOSESD Symposium)**

M. Hamdalla, T. Ory, A. Harmon, D. Beetner, V. Khilkevich, J. McGeehan, J. Willits, A. Caruso, A. Hassan, "Worst-Case Electromagnetic Coupling to an Accelerometer using an Equivalent Circuit and

Experimental Co-Characterization Methodology," 2023 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (USNC-URSI), 2023

L. Shen, Y. Xu, S. Holland, S. Bub, D. Pommerenke, D. Beetner, "Application of TVS Models for SEED Simulation of a Variety of TVS Devices," Asia-Pacific EMC Symposium, 2023.

G. Tsintsadze, H. Manoharan, D. Commerou, B. Booth, K. Martin, D. Beetner, "Predicting Radiated Emissions from an Electrical Drive System," Asia-Pacific EMC Symposium, 2023.

A. Harmon, J. Hunter, C. Goins, A. Hassan, V. Khilkevich, D. Beetner, "Modeling the Conducted Susceptibility of an Integrated Circuit Port to High-Frequency RF Waveforms," Annual Directed Energy Science and Technology Symposium, March 2023.

C. Goins, A. Harmon, A. Hassan, J. McGeehan, V. Khilkevich, D. Beetner, "Design and Construction of an Arbitrary Pulse Compressive Amplifier," Annual Directed Energy Science and Technology Symposium, March 2023.

S. Xia, J. Hunter, A. Harmon, M. Hamdalla, A. Hassan, V. Khilkevich, D. Beetner, "Predicting Electromagnetic Coupling to PCBs using a Segmentation Modeling Approach," Annual Directed Energy Science and Technology Symposium, March 2023.

J. McGeehan, J. Willits, S. Roth, A. Hassan, D. Beetner, "Dial-in-the-Defeat: Predicting the Most Effective Agile Waveform for RF Attack," Annual Directed Energy Science and Technology Symposium, March 2023.

M. Hamdalla, T. Ory, A. Harmon, D. Beetner, V. Khilkevich, J. McGeehan, J. Willits, A. Caruso, A. Hassan, "Estimation of the Worst-Case Coupling to Complex Devices using the Equivalent Circuit Approach," Annual Directed Energy Science and Technology Symposium, March 2023.

F. Ma, R. He, S. Walunj, T. Makharashvili, B. Booth, K. Martin, C. Hwang, D. Beetner, "Predicting Radiated Emissions from a Complex Transportation System Wiring Harness," 2022 EMC+SIPI Symposium, 2022 (**Best EMC paper, honorable mention, out of roughly 100 in area**).

H. Manoharan, R. He, F. Ma, B. Booth, K. Martin, D. Beetner, "Influence of Conformal Coatings on the EMC Performance of a Printed Circuit Board," APEMC, 2022

J. Hunter, S. Xia, A. Harmon, M. Hamdalla, A. Hassan, V. Khilkevich, D. Beetner, "A Segmentation Strategy for Structures with Common Mode Coupling," 2022 EMC+SIPI Symposium, 2022 (**Best student EMC paper, honorable mention)**

Y. Xu, J. Zhou, S. Bub, S. Holland, J. Meiguni, D. Pommerenke, D. Beetner, "Modeling an ESD Gun Discharge to a USB Cable," 2022 EMC Symposium, 2022 (**Finalist, best student EMC paper. Selected by EOS/ESD Society for special invited re-presentation to the 2023 EOSESD Symposium)**

Z. Sun, V. Khilkevich, J. Liu, X. Xiong, D. Kim, D. Beetner, "Extraction of Stripline Surface Roughness Using Cross-section Information and S-parameter Measurements," 2022 EMC+SIPI Symposium, 2022 (**Finalist, best student SIPI paper).**

X. Yan, S. Wu, M. Xue, C. K. Leung, D. Beetner, J. Zhang, "A Practical Simulation Flow for Singing Capacitor Based Acoustic Noise Analysis," 2022 EMC+SIPI Symposium, 2022.

S. Xia, J. Hunter, A. Harmon, M. Hamdalla, A. Hassan, C. Hwang, V. Khilkevich, D. Beetner, "A Fast Cascading Method for Predicting the Coupling from External Plane Waves to PCBs," 2022 EMC+SIPI Symposium, 2022.

S. Holland, S. Rauchel, G. Notermans, Y. Xu, L. Shen, D. Beetner, D. Pommerenke, "Determining the Peak Voltage during TVS switching at the I/O of an IC using Component Measurement Data," 2022 Electrical Overstress and Electrostatic Discharge Symposium, 2022

M. Z. M. Hamdalla, S. Baidya, D. Beetner, V. Khilkevich, J. McGeehan, A. N. Caruso, A. M. Hassan, "Using the Equivalent Circuit Approach for Modeling the Electromagnetic Coupling to Multilayer PCB Traces," IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, Denver, CO July 10-15, 2022.

R. Hunt, M. Z. M. Hamdalla, J. Harp, D. Beetner, V. Khilkevich, J. McGeehan, A. N. Caruso, A. M. Hassan, "Using Black-Box Macro modeling of Multiport Microwave Components for Electromagnetic Simulations," IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, Denver, CO July 10-15, 2022.

Z. Sun, V. Khilkevich, X. Xiong, J. Liu, D. Beetner, "Extraction of dielectric loss tangent and surface roughness using S-parameter measurements and cross-sectional analysis," CadenceLIVE Silicon Valley 2022, June 8-9, 2022.

H. Rezaei, D. Beetner, M. Drallmeier, W. Huang, D. Pomerenke, "1 Ohm Disk Resistor Full Wave Modeling for JS-002 Standard," 2021 International EOS/ESD Symposium on Design and System (IEDS), 2021. (**Best student paper)**

J. Hunter, S. Xia, A. Harmon, A. Hassan, V. Khilevich, D. Beetner, "Modeling and Statistical Characterization of Electromagnetic Coupling to Electronic Devices," IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, Jan. 4-9, 2021.

M. li, S. Bai, T. Makharashvili, A. Ruehli, J. Drewniak, D. Beetner, "Impact of Accuracy of Capacitor ESL Values in High-Speed Power Delivery Network Design," 2021 IEEE International Symposium on EMC and SIPI, 2021.

Y. Xu, J. Zhou, J. Meighuni, S. Bub, S. Holland, D. Pommerenke, D. Beetner, "SEED Modeling of an ESD Gun Discharge to a USB Cable Surrogate," 2021 IEEE International Symposium on EMC and SIPI, 2021. (**Finalist, best student paper)**

M. Homdalla, B. Bissen, J. Hunter, L. Yuanzhuo, V. Khilkevich, D. Beetner, A. Caruso, A. Hassan, "Prediction of experimental electromagnetic coupling to a UAV model using characteristic mode analysis," TechRxiv, 2021.

S. Marathe, A. Patnaik, K. Ghosh, J. Kim, D. Pommerenke and D. G. Beetner, "Experimental Validation of an Integrated Circuit Transient Electromagnetic Event Sensor," 42nd EOS/ESD Symposium, Sept. 13-17, 2020 (invited re-presentation/publication).

S. Walunj, T. Makharashvili, B. Booth, K. Martin, C. Hwang, D. Beetner, "Direct Measurement and Representation of Common-mode Sources in Cable Harnesses," 2020 IEEE International Symposium on EMC and SIPI, 2020.

J. Zhou, J. Meiguini, S. Bub, S. Holland, G. Notermans, Y. Xu., G. Maghlakelidze, D. Pommerenke, D. Beetner, "Race Conditions Among Protection Devices for a High Speed I/O Interface," 2020 42nd Annual EOS/ESD Symposium (EOS/ESD), 2020.

Z. Peng, S. Marathe, H. Rezaei, G. Maghlakelidze, D. Pommerenke, A. Foudazi, C.W. Lam, D. Beetner, D. Kim, "Trend Analysis of Dissipated Electrostatic Discharge Energy in Touchscreen Displays," 2020 IEEE International Symposium on EMC and SIPI, 2020.

H. Rezaei, Z. Peng, S. Marathe, D. Pommerenke, C.W. Lam, A. Foudazi, D. Beetner, D. Kim, "Experimental characterization and methodology for full-wave modeling of ESD to displays," 2020 IEEE International Symposium on EMC and SIPI, 2020.

J. Hunter, S. Xia, A. Harmon, A. Hassan, V. Khilkevich, and D. Beetner, "Simulation-Driven Statistical Characterization of Electromagnetic Coupling to UAVS," Annual Directed Energy Science and Technology Symposium, March 2020.

L. Ren, D. Beetner, S. Sun, P. Boyle, M. Scheppers, C. Stagner, M. Deo, J. Drewniak, "Vectorless Estimation of Power Consumption Variations in an FPGA," DesignCon 2011.

C. Sui, L. Ren, D. Beetner, J. Drewniak, "Vectorless prediction of simultaneous switching noise from FPGAs," DesignCon 2015. **(Best paper award)**.

I. Zamek, P. Boyle, Z. Li, S. Sun, X. Chen, S. Chandra, T. Li, D. Beetner, J. Drewniak, "Modeling FPGA Current Waveform and Spectrum and PDN Noise Estimation," DesignCon, Feb. 2008. (Refereed paper.) **(Finalist for best paper award)**

Recent Patents/Patent Disclosures

D. Beetner, V. Khilkevich, S. Xia, J. Hunter, A. Hassan, A. Harmon, "Rapid Prediction of Electromagnetic Coupling to Electronic Circuits and Harnesses," Invention Disclosure, Jan. 2023, U.S. Prov. Pat. App. No 63/617,682.

Sponsored Research:

Total grant and contracts expenditures: >$35M
Total value of Beetner's contribution: >$8M
Contribution to Federal research expenditures since 2020: $1.2M
Contribution to Industry research expenditures since 2020: $2.0M

Recent Expenditures

Fiscal Year	Expenditures Shared Credit	Total	
2020	$404,365	$1,571,842	(*while ECE Chair)*
2021	$380,164	$1,492,236	
2022	$513,479	$1,867,370	
2023	$736,840	$2,117,460	
2024	$633,674	$2,001,013	
TOTAL	**$2,668,522**	**$9,049,921**	

Recent Grants and Contracts (since 2022)

Principal Invest.	Project Title	Sponsor	Start	End	Amount	% Credit
Beetner,Daryl G	Collaborative Research: Phase III Center for Electromagnetic Compatibility- An Industry/University Cooperative Research Collaboration	NSF DIV OF INDUSTRIAL INNOV & PARTNERSHP	12/15/2019	11/30/2025	$300,000	34
Kim,DongHyun	CEMC Membership Agreement for Cisco 4-EMC	CISCO SYSTEMS INC	8/1/2021	7/31/2025	$180,500	20
Sedighsarvestani, Sahra	GAANN - Doctoral Research and Training in Cybersecurity through Electromagnetic Compatibility	US DEPT OF EDUC	10/1/2021	9/30/2024	$407,586	12
Beetner,Daryl G	Waveform Agile Radiofrequency (RF) Directed Technology Energy (WARDEN)	DARPA *(through BAE SYSTEMS)*	10/21/2021	9/15/2024	$1,220,794	50
Hwang,Chulsoon	CEMC Membership Agreement for Apple-2 (ESD)	APPLE COMPUTER INC	9/28/2021	9/27/2024	$140,000	20
Beetner,Daryl G	N22A-T006 STTR Phase 1 - Platform-level Electromagnetic Compatibility Simulator (PECS)	ARL *(through VERUS RESEARCH)*	9/19/2022	1/23/2023	$39,798	80
Khilkevich,Victor	CEMC Membership Agreement for Juniper Networks	JUNIPER NETWORKS INC	4/12/2020	4/11/2025	$240,000	20
Khilkevich,Victor	CEMC Membership Agreement for Cisco Material	CISCO SYSTEMS INC	11/1/2020	10/31/2024	$140,000	20
Sedighsarvestani, Sahra	APEX: An Accelerated Pipeline to Graduate Excellence in Electrical and Computer Engineering	NSF DIV UNDERGRADUATE EDUC	10/1/2022	9/30/2028	$1,052,403	10
Beetner,Daryl G	Faraday X: Improvement of the DCRET Data Center Emissions Prediction Tool for Multi-Story Buildings	FCL TECH INC *(i.e. Meta/Facebook)*	6/1/2022	6/30/2024	$154,874	100
Hwang,Chulsoon	CEMC Membership Agreement for Cisco-PDN	CISCO SYSTEMS INC	11/1/2022	10/31/2024	$70,000	20
Jiang,Lijun	CEMC Membership Agreement for Asustek Computer Inc.	ASUSTEK COMPUTER INC	2/1/2022	1/31/2025	$140,000	20
Kim,DongHyun	CEMC Membership Agreements for Cisco-SI	CISCO SYSTEMS INC	2/15/2022	2/14/2025	$210,000	20
Kim,DongHyun	CEMC Membership Agreement for Google EMI	GOOGLE LLC	3/2/2022	8/1/2023	$100,000	20
Jiang,Lijun	CEMC Membership Agreement for IBM	IBM PERSONAL SYS GROUP	4/1/2022	3/31/2025	$140,000	20
Kim,DongHyun	CEMC Membership Agreement for Intel Corporation(Oregon)	INTEL CORP	3/15/2022	3/14/2025	$210,000	20
Hwang,Chulsoon	CEMC Membership Agreement for Sony EMCs-RFI	SONY GLOBAL MFG AND OPERATIONS CORP	4/1/2022	3/31/2023	$70,000	20
Jiang,Lijun	CEMC membership Agreement for Cadence	CADENCE BUILDING SYS INC	2/17/2023	2/16/2025	$210,000	60
Beetner,Daryl G	CEMC Membership Agreement for Deere & Company	JOHN DEERE INTELLIGENT SOLUTIONS GROUP	3/24/2022	3/23/2025	$210,000	60
Kim,DongHyun	CEMC Membership Agreement for LG	LG ELECTRONICS	4/15/2022	7/14/2023	$70,000	20
Hwang,Chulsoon	CEMC Associate Membership Agreement for Kemet	KEMET ELECTRONICS CORP	4/2/2022	4/1/2023	$35,000	20
Beetner,Daryl G	CEMC Membership Agreement for Nexperia	NEXPERIA B.V.	5/1/2022	4/30/2025	$210,000	60
Hwang,Chulsoon	CEMC Membership Agreement for Amazon	AMAZON.COM INC	5/20/2022	5/19/2025	$210,000	20
Hwang,Chulsoon	CEMC Membership Agreement for Google-PI	GOOGLE LLC	8/15/2022	8/14/2024	$140,000	20
Beetner,Daryl G	Collaborative Research: Phase III Center for Electromagnetic Compatibility- An Industry/University Cooperative Research Collaboration	US Army *(through NSF MIPR)*	12/15/2019	11/30/2025	$70,000	34
Hwang,Chulsoon	CEMC Membership Agreement for Meta-RFI	META	12/8/2022	12/7/2024	$140,000	20
Hwang,Chulsoon	CEMC Associate Membership Agreement for Clear Signal Solution	CLEAR SIGNAL SOLUTIONS	1/1/2023	12/31/2024	$70,000	20
Beetner,Daryl G	CEMC Dassault Systemes Membership	DASSAULT SYS SIMULIA CORP *(i.e. CST)*	4/1/2023	3/31/2025	$70,000	60
Hwang,Chulsoon	CEMC Membership Agreement for ESDEMC	ESDEMC TECH LLC	8/14/2023	8/13/2024	$35,000	20
Beetner,Daryl G	PTERA Project Review and Modeling	OFFICE OF NAVAL RESEARCH	8/30/2021	8/29/2026	$5,000	100

Recent Invited Presentations

Keynote speaker, EMC Korea, July 2024 (*to over 300 attendees*).

Invited presenter to the C. R. Paul Global EMC University (*IEEE EMC Society's flagship paid tutorial to industry*) on "Crosstalk." 2023, 2024 (and invited for 2025)

Invited presentation for the 2023 EMC+SIPI Symposium's session on "exemplary papers from the IEEE Transactions on EMC," detailing our paper on "Transient Analysis of ESD Protection Circuits for High-Speed ICs."

Invited re-presentation of the paper "ESD Behavior of RF Switches and Importance of System Efficient ESD Design." to the 2024 EOS/ESD Symposium, selected as an exemplary paper from the 2023 IEEE EMC Symposium

Invited re-presentation of the paper "Modeling an ESD Gun Discharge to a USB Cable" to the 2023 EOS/ESD Symposium, selected as an exemplary paper from the 2022 IEEE EMC Symposium.

Invited re-presentation of the paper "Experimental Validation of an Integrated Circuit Transient Electromagnetic Event Sensor" to the 2020 EOS/ESD Symposium, selected as an exemplary paper from the 2019 IEEE EMC Symposium.

Sandia National Labs, "Prediction and Analysis of Electromagnetic Susceptibility of Electronic Systems," Dec. 2024

Lawrence Livermore National Labs, "Prediction and Analysis of Electromagnetic Susceptibility of Electronic Systems," Feb. 2025.

Korean Advanced Institute for Science and Technology, 2024

Indian Institute of Technology, Delhi, 2024, 2023

Indian Institute of Technology, Roorkee, 2024, 2023

Indian Institute of Science, 2023

Manipal University, 2023

Amazon, Inc. "EMC and SI fundamentals," 2022.

Invited Speaker, University of Missouri System Leadership Development series, 2019, 2020 (*multiple sessions throughout year to targeting development of Department Chairs*)

Students and Advising:

Graduated 35 MS students and 16 PhD students
Currently supervising 1 MS, 4 PhD students, 1 postdoc, and 1 NTT Research Faculty
Financially supported/supervised tens of undergraduates in my research

Recent Advising/Mentorship (since 2021)

PhDs Graduated

1. J. Zhou (now at Apple)
2. X. Yan (now at Google)
3. H. Rezaei (now at Intel

4. S. Penugonda (now at Cisco)

MS Graduated
1. L. Shen (now at ESDEMC, Inc.)
2. L. Liu (now at AMD)
3. G. Tsintsadze (now at Cisco, Inc.)
4. M. Starkey (now at Sandia National Labs)
5. F. Ma (startup in China)
6. Y. Xu (now at Tesla)
7. R. Mi (Graz Technical University for PhD)
8. J. Li (Cisco)

Graduate Students in Progress
- 4 PhD: A. Harmon, M. Juszczyk, T. Wang, C. Goins
- 1 MS: D. Szanto

Undergraduate Research Assistants
H. Cooper, V. Nguyen, S. Essary, A. Hill, S. McDaniel, D. Szanto, A. Lazarski, P. Chavarria, G. Snyder, A. King, E. Jones, M. Starkey, C. Vermillion, C. Buneta

Supervised Postdocs / NTT Research Faculty
1. Victor Khilkevich (Research Professor - ongoing)
2. Seyed Mousavi (Postdoc. Joined Molex, Inc.)
3. Hongseok Kim (Research faculty. Joined Korean Advanced Institute of Science and Technology)

Visiting Scholars
1. Stanley Kuja (Faculty from Capetown University, South Africa)
2. Minseok Kwan (MS from Chongseok U., Korea)
3. Shivali (MS from IIT-Roorkee, India)
4. Daniel Commerou (MS from University of Southern Denmark)

Faculty Mentorship
1. Donghyun "Bill" Kim (Asst. Prof., S&T)
2. Chulsoon Hwang (recently promoted to Assoc. Prof., S&T)
3. Mina Esmaeelpour (Asst. Prof., S&T)
4. Ahmed Hassan (promoted to Assoc. Prof., UMKC)
   and several others…

Selected Professional Service:

Over last 10 years, have served on 19 external professional and conference committees and 8 review panels (5 times as the chair, 2 times as vice-chair, 3 times as secretary, and 23 times as a member). Some significant roles include:

- Member, IEEE Medals Council (2021-2023) *(The Medal is IEEE's very highest technical honor – it's ECE's "Nobel Prize")*
- Chair, IEEE Medal for Environmental and Safety Technologies Selection Committee (2020-2024) *(Appointed by Medals Council)*

- Member, IEEE EMC Society Board of Governors (2022-pres.) *(Elected position providing guidance for overall direction of EMC Society)*
- Chair, IEEE EMC Society Educational Grants Committee (2011-14, 2021-pres.) *(Awards ~$10k/year in educational grants)*
- Chair, IEEE EMC Society Technical Committee on Electromagnetic Interference Control (2022-2024, Secretary 2020-22) *(Elected position. Largest technical committee focused on electromagnetic interference).*
- Member, IEEE-HKN Outstanding Young Professional Award Committee (2018-present)
- Chair, Central States ECE Department Heads Association (2018-19, vice-chair 2017-18, sec/treasurer 2016-17) *(Elected position. Includes large portion of universities throughout the midwest).*
- Associate Editor, IEEE Transactions on Instrumentation and Measurement (2009-15)
- Founder and Conference Chair, *Silicon Valley Area Workshop on EMC*, Nov. 22, 2024, Milpitas, CA
- External Tenure and Promotion reviews recently for: University of Illinois Urbana-Champaign, Tsinghua University, Polytechnic University of Torino, University of Arkansas, University of Missouri Kansas City, Missouri State University
- External Program review: University of Arkansas MS and PhD CpE program review

Selected University Service:

Over last 10 years, have served on more than 39 S&T and UM System committees (12 times as the chair, 1 time as vice-chair, and 32 times as a member). Some significant roles include:

- Member, Missouri S&T Board of Trustees Research and Technology Commercialization Committee (2019-present)
- Member, Campus Research Leadership Council (2020-present)
- Chair, External Review Panel for the Center for Research in Energy and Environment (CREE) (2024)
- Member, Strategic Planning Faculty Taskforce on Academic Programs (2024)
- Member, Center for Advancing Faculty Excellence, Steering Committee (2017-22)
- Member, MAE Strategic Planning Committee (2020-21)
- Chair, Electrical and Computer Engineering, Missouri S&T (2014-20)
- Member, S&T Research Center Evaluation Committee (2018-19)
- Chair, University of Missouri Research Board (2011-15, Member 2010-15) *responsible for management of approximately $2.2 million in competitive research funding distributed to University of Missouri System faculty each year.*
- Chair, Department Chairs' Council, Missouri S&T (2017-18, Sec./Vice-Chair 2016-17) *(Includes all Department Chairs at Missouri S&T)*
- Member, Chancellor's Council, Missouri S&T (2015-19) *(Provide input to Chancellor's leadership team)*
- Chair, CEC Department Chairs' Leadership Committee, Missouri S&T (2015-17) *(Included all Chairs within the CEC. Provided critical role during 2016-17 transition of CEC Deans).*

Selected Teaching:

Recent Lecture Courses

Semester	Course Number	Course Title	Delivery	Number of students	Average Student Evaluation
F21	EE 5600	Interference Control	Rolla, UMKC, online	41	4.0/4.0
Sp22	CpE 6230	Advanced VLSI Design	Rolla online	16	3.9/4.0
F22	EE 5600	Interference Control	Rolla, UMKC, online	25	4.0/4.0
Sp23	EE 6630	Computational Electromagnetics	Rolla	15	4.0/4.0
F23	EE 5600	Interference Control	Rolla, UMKC, online	34	3.8/4.0
Sp24	CpE 6230	Advanced VLSI Design	Rolla	8	4.0/4.0
F24	EE 5600	Interference Control	Rolla, UMKC, online	22	4/0/4.0

Selected Examples of Other Contributions to Teaching

- Instructor for the IEEE EMC Society Clayton R. Paul Global University (2023, 2024, and invited for 2025) *(EMC Society's premier (paid) tutorial for practicing engineers).*
- Short course on EMC/SIPI to Amazon (2022) *(20-hour course on highly-focused, applied topic to roughly 25 practicing engineers).*
- Voluntarily offer the course "Interference Control" to additional students across the UM System and to students in industry: UMKC (F18, F19, F20, F21, F22, F23, F24 – *roughly 10 students/sem.*), Springfield (F20 – *roughly 10 students*), and distance (F06, F07, F10, F12, F16, F17, F18, F19, F20, F21, F22, F23, F24 – *roughly 4 students/sem.*).
- Instructor for EMC Principles, 3rd Edition *(S&T's top-earning non-credit video lecture course until course was no longer offered in 2019)*.
- Visiting Instructor to ESIGELEC, Rouen, France, teaching 20-hour course on Embedded Systems (2006, 2007, 2008, 2009, 2010, 2011, 2012, 2014)
- Leader/co-lead of ECE's ABET review (2020, 2014, 2008)
- Service positions as ECE Department Chair (2014-20) and Associate Chair for CpE (2005-9)
- Chair of IEEE-EMCS EMC Educational Grants Committee (2021-Present)
- Vice-Chair of IEEE-EMCS Educational and Student Activities Committee (2013-14, secretary 2012-13) *(Committee spearheads all of the educational activities of the IEEE EMC Society).*
- IEEE-EMC Society Tutorials Chair (2007-10)
- Member, Center for Advancing Faculty Excellence Steering Committee (2017-2023) *(Center is primary organization responsible for building S&T faculty into highly effective educators).*
- Adjunct Faculty to Indian Institute of Technology, Roorkee (2024-pres.) *(provide guest lectures, stream course information, and build a pipeline of outstanding graduate students for S&T)*

Development Activities:

Recent development activities have led, in part, to:

- $100k donation over 5 years to renovate the ECE Power Laboratory (2018)
- $1M donation to create the Woodard Associate Professorship of Excellence (2019) *(Endowed position supporting two early-career faculty at Associate Professor level).*
- $150k scholarship donation over 5 years from ECE Academy (2019)
- $100k equipment donation to EMC Lab from Cisco Systems (2019)
- $135k equipment donation to EMC Lab from the Air Force Research Lab (valued at more than $400k new) (2020)
- $25k, EMC Lab Endowment, MUELAN EMC Laboratory Alumni Network (2020)
    - Grown to more than $55k by 2024
- $130k equipment donation to EMC Lab from Cisco Systems (2021)
- $100k donation commitment to EMC Lab through charitable trust (2023)