

ROBERT C.N. PILAWA-PODGURSKI

Associate Professor, Department of Electrical and Computer Engineering

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EDUCATION

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|---------------------------------------|---|-------------|
| Massachusetts Institute of Technology | Electrical Engineering | Ph.D. 2012 |
| Massachusetts Institute of Technology | Electrical Engineering and Computer Science | M.Eng. 2007 |
| Massachusetts Institute of Technology | Electrical Engineering and Computer Science | B.S. 2005 |
| Massachusetts Institute of Technology | Physics | B.S. 2005 |

ACADEMIC POSITIONS

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| 2017 – present | Associate Professor | Department of Electrical and Computer Engineering University of Illinois at Urbana-Champaign, Urbana, IL |
| 2012 – 2017 | Assistant Professor | Department of Electrical and Computer Engineering University of Illinois at Urbana-Champaign, Urbana, IL |
| 2017 – present | Affiliate Faculty | Coordinated Science Lab, University of Illinois at Urbana-Champaign, Urbana, IL |
| 2012 – present | Affiliate Faculty | Information Trust Institute, University of Illinois at Urbana-Champaign, Urbana, IL |
| 2016 (summer) | Visiting Professor | KTH – Royal Institute of Technology, Stockholm, Sweden |
| 2007 – 2011 | Research Assistant | Laboratory for Electromagnetic and Electronic Systems, Research Laboratory of Electronics, MIT, Cambridge, MA |

SELECTED HONORS AND AWARDS

RESEARCH

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| 2017 | IEEE Workshop on Control and Modeling for Power Electronics (COMPEL) Best Paper Awards (for two papers) |
| 2017 | UIUC Campus Distinguished Promotion Award – given each year to 2-4 promoted scholars campus-wide for extraordinary contributions in terms of quality of work and overall achievement |
| 2017 | Helm Fellow (University of Illinois Urbana-Champaign) |
| 2016 | IEEE Energy Conversion Congress & Exposition (ECCE) Best Paper Award |
| 2016 | IEEE Workshop on Control and Modeling for Power Electronics (COMPEL) Best Paper Award |
| 2016 | UIUC Dean's Award for Excellence in Research |
| 2015 | Google/IEEE PELS Little Box Challenge Finalist – 18 teams selected worldwide |
| 2015 | IEEE Workshop on Control and Modeling for Power Electronics (COMPEL) Best Paper Award |

- 2015 Air Force Office of Scientific Research - Young Investigator Award
- 2014 Richard M. Bass Outstanding Young Power Electronics Engineer Award from the IEEE Power Electronics Society (PELS), for “Innovations in the design and application of miniaturized high-performance dc-dc converters”, given annually to one individual for outstanding contributions to the field of power electronics before the age of 35
- 2014 IEEE Workshop on Control and Modeling for Power Electronics (COMPEL) 1st Prize Best Paper Award
- 2014 Google/IEEE PELS Little Box Challenge Academic Award
- 2013 IEEE Workshop on Control and Modeling for Power Electronics (COMPEL) Best Paper Award
- 2013 Google Faculty Research Award
- 2013 IEEE Power and Energy Conference at Illinois Best Paper Award
- 2011 IEEE Energy Conversion Congress & Exposition, Best Presentation Award
- 2010 IEEE Applied Power Electronics Conference, Best Presentation Award
- 2010 Analog Devices, Inc. Outstanding Student Designer from MIT
- 2008 Semiconductor Research Corporation Inventor Recognition Award
- 2007 Chorafas Award for outstanding MIT EECS Master’s thesis.
- 2007 Joseph Lewin Morris Award for best thesis presentation at the MIT EECS Masterworks Symposium
- 2006 Siebel Scholar: One of five MIT EECS Master’s students selected for fellowship based on outstanding academic performance and leadership
- 2001 Erik and Göran Ennerfelt’s Scholarship for International Studies for Young Swedes
Approximately five students selected annually nationwide based on academic performance

TEACHING AND ADVISING

- 2017 UIUC ECE Ronald W. Pratt Faculty Outstanding Teaching Award
- 2014 UIUC Engineering Council Award for Excellence in Advising
- 2012- UIUC List of Teachers Ranked as Excellent by Their Students: 2012, 2013, 2014, 2015, 2016 (ECE 464, ECE 469, ECE 598)
- 2012- UIUC List of Teachers Ranked as Excellent by Their Students, with distinction of ‘outstanding’ (typically 1-2 faculty members recognized each year): 2012, 2015, 2016 (ECE 464, ECE 469, ECE 598)

ADVISED STUDENT AWARDS

- 2017 Ernest E. Reid Fellowship Award (Zichao Ye)
- 2017 Best Presentation Awards (4), IEEE Applied Power Electronics Conferences (Christopher Barth, Enver Candan, Thomas Foulkes, Andrew Stillwell)
- 2016 IEEE Region 4 Outstanding Student Award (Christopher Barth)
- 2016 Top Innovation Award, IEEE International Future Energy Challenge (Advisor to Student Team)
- 2016 Best Presentation Award, IEEE APEC (Yutian Lei)
- 2015 National Science Foundation Graduate Fellowship Award (Thomas Foulkes)
- 2014 Best Presentation Award, IEEE APEC (Christopher Barth)
- 2013 IEEE ECCE Student Demonstration. First Prize Winner (Shibin Qin)
- 2013 National Science Foundation Graduate Fellowship Award (Josiah McClurg)

PUBLICATIONS

JOURNAL PUBLICATIONS

- [J.22] Y. Lei, W-C Liu, R.C.N. Pilawa-Podgurski, "An Analytical Method to Evaluate and Design Hybrid Switched-Capacitor and Multilevel Converters," *IEEE Transactions on Power Electronics*, in press
- [J.21] J. Oh, P. Birbarah, T. Foulkes, S.L Yin, M. Rentauskas, J. Neely, R.C.N. Pilawa-Podgurski, N. Miljkovic, "Jumping-Droplet Electronics Hot-Spot Cooling," *Physics Review Letter*, accepted for publication
- [J. 20] J.Y. Tsao, S. Chowdhury, M.A. Hollis, D. Jena, N.M. Johnson, K.A. Jones, R.J. Kaplar, S. Rajan, C.G. Van de Walle, E. Bellotti, C.L. Chua, R. Collazo, M.E. Coltrin, J.A. Cooper, K.R. Evans, S. Graham, T.A. Grotjohn, E.R. Heller, M. Higashiwaki, M.S. Islam, P.W. Juodawlkis, M.A. Khan, A.D. Koehler, J.H. Leach, U.K. Mishra, R.J. Nemanich, R.C.N. Pilawa-Podgurski, J.B. Shealy, Z. Sitar, M.J. Tadjer, A.F. Witulski, M. Wraback, J.A. Simmons, "Ultrawide-Bandgap Semiconductors: Research Opportunities and Challenges," *Advanced Electronic Materials*, in press
- [J. 19] Y. Lei, C. Barth, S. Qin, W-C Liu, I. Moon, A. Stillwell, D. Chou, T. Foulkes, Z. Ye, Z. Liao, R.C.N. Pilawa-Podgurski "A 2 kW, Single-Phase, 7-Level Flying Capacitor Multilevel Inverter with an Active Energy Buffer," *IEEE Transactions on Power Electronics*, in press.
- [J.18] E. Candan, P. Shenoy and R.C.N. Pilawa-Podgurski, "Hot-swapping Analysis and Implementation of Series-Stacked Server Power Delivery Architectures" *IEEE Transactions on Power Electronics*, in press.
- [J.17] S. Qin, Y. Lei, C. Barth, W-C. Liu and R.C.N. Pilawa-Podgurski, "A High Power Density Series-stacked Energy Buffer for Power Pulsation Decoupling in Single-Phase Converters" *IEEE Transactions on Power Electronics*, in press
- [J.16] M. Schuck, A. Ho and R.C.N. Pilawa-Podgurski, "Asymmetric Interleaving in Low-Voltage CMOS Power Management with Multiple Supply Rails," *IEEE Transactions on Power Electronics*, Vol. 32, No. 1, pp. 715-722, January 2017.
- [J.15] S. Qin, C. Barth, R.C.N. Pilawa-Podgurski, "Enhancing Micro-inverter Energy Capture with Sub-module Differential Power Processing," *IEEE Transactions on Power Electronics*, Vol. 31, No. 5, pp. 3575-3585, May 2016.
- [J.14] E. Candan, P. Shenoy and R.C.N. Pilawa-Podgurski, "A Series-Stacked Power Delivery Architecture with Isolated Differential Power Conversion for Data Centers," *IEEE Transactions on Power Electronics*, Vol. 31, No. 5, pp. 3690-3703, May 2016.
- [J.13] R. Bell, R.C.N. Pilawa-Podgurski, "Decoupled and Distributed Maximum Power Point Tracking of Series-Connected Photovoltaic Sub-Modules Using Differential Power Processing," *IEEE Journal of Emerging and Selected Topics in Power Electronics*, Vol. 3, No. 4, pp. 881-891, December 2015.
- [J.12] S. J. Kim, R. K. Nandwana, Q. Khan, R. Pilawa-Podgurski, P. K. Hanumolu "A 1.8V 30-to-70MHz 87% Peak-Efficiency 0.32 mm² 4-Phase Time-Based Buck Converter Consuming 3 μ A/MHz Quiescent Current in 65nm CMOS," *IEEE Journal of Solid State Circuits* Vol 50. No. 12, pp. pp. 2814 - 2824, December 2015
- [J.11] R.C.N. Pilawa-Podgurski, W. Li, I. Celanovic, D.J. Perreault, "Integrated CMOS Energy Harvesting Converter with Digital Maximum Power Point Tracking for a Portable Thermophotovoltaic Power

Generator,” *IEEE Journal of Emerging and Selected Topics in Power Electronics*, Vol. 3, No. 4, pp. 1021-1035, December 2015.

[J.10] Y. Lei, R. May, R.C.N. Pilawa-Podgurski, “Split-Phase Control: Achieving Complete Soft-Charging Operation of a Dickson Switched-Capacitor Converter,” *IEEE Transactions on Power Electronics*, Vol. 31, No. 1, pp. 770-782, January 2016.

[J.9] M. Schuck, R.C.N. Pilawa-Podgurski, “Ripple Minimization through Harmonic Elimination in Asymmetric Interleaved Multiphase dc-dc Converters,” *IEEE Transactions on Power Electronics*, Vol. 30, No. 12, pp. 7202-7214, December 2015.

[J.8] Y. Lei, R.C.N. Pilawa-Podgurski “A General Method for Analyzing Resonant and Soft-charging Operation of Switched-Capacitor Converters,” *IEEE Transactions on Power Electronics*, Vol. 30, No. 10, pp. 5650-5664, October 2015

[J.7] C. Barth, R.C.N. Pilawa-Podgurski “Dithering Digital Ripple Correlation Control for Photovoltaic Maximum Power Point Tracking,” *IEEE Transactions on Power Electronics*, Vol. 30, No. 8, pp. 4548-4559, August 2015.

[J.6] S. Qin, S.T. Cady, A.D. Dominguez-Garcia, R.C.N. Pilawa-Podgurski “A Distributed Approach to Maximum Power Point Tracking for Photovoltaic Sub-Module Differential Power Processing,” *IEEE Transactions on Power Electronics*, Vol. 30, No.4, pp. 2024-2040, April 2015.

[J.5] W.R. Chan, P. Bermel, R.C.N. Pilawa-Podgurski, C.H. Marton, K.F. Jensen, J.J. Senkevich, J.D. Joannopoulos, M. Soljacic and I. Celanovic “Toward high-energy-density, high-efficiency, and moderate-temperature chip-scale thermophotovoltaics,” *Proceedings of the National Academy of Sciences*, February 25, 2013.

[J.4] R.C.N. Pilawa-Podgurski, D.J. Perreault “Sub-Module Integrated Distributed Maximum Power Point Tracking for Solar Photovoltaic Applications,” *IEEE Transactions on Power Electronics*, Vol. 28, No. 6, June 2013.

[J.3] A. Latham, R.C.N. Pilawa-Podgurski, K.F. Odam, C.R. Sullivan, “Analysis and Optimization of Maximum Power Point Tracking Algorithms in the Presence of Noise,” *IEEE Transactions on Power Electronics*, Vol. 28, No. 7, July 2013.

[J.2] R.C.N. Pilawa-Podgurski, D.J. Perreault, “Merged Two-Stage Power Converter with Soft Charging Switched-Capacitor Stage in 180 nm CMOS,” *IEEE Journal of Solid-State Circuits*, Vol. 47, No 7, pp. 1557-1567, 2012.

[J.1] R.C.N. Pilawa-Podgurski, A.D. Sagneri, J.M. Rivas, D.I. Anderson, and D.J. Perreault, “Very High Frequency Resonant Boost Converters,” *IEEE Transactions on Power Electronics*, Vol. 24, No 6, pp. 1654-1665, 2009.

In review

B. Macy, Y. Lei and R.C.N. Pilawa-Podgurski “A High Power Density, High Efficiency Resonant Dickson Switched-Capacitor Converter with Split-Phase Control,” in review.

A. Stillwell, R.C.N. Pilawa-Podgurski “A Resonant Switched-Capacitor Converter with GaN Transistors for High Efficiency Power Delivery to Series-Stacked Processors,” in review.

S. Qin, Y. Lei, Z. Ye, D. Chou, R.C.N. Pilawa-Podgurski, "A High Power Density Power Factor Correction Front End Based on 7-Level Flying Capacitor Multilevel Converter," in review

P. Assem, W.-C. Liu, Y. Lei, P. Hanumolu, "A Direct Battery Hook-Up Hybrid Dickson Switched-Capacitor DC-DC Converter with Wide Continuous Conversion Ratio in 65 nm CMOS," in review

D. Chou, Y. Lei, R.C.N. Pilawa-Podgurski, "A Zero-Voltage-Switching, Physically Flexible Multilevel GaN DC-DC Converter," in review

CONFERENCE PUBLICATIONS

[C.62] N. Brooks, S. Qin, R.C.N. Pilawa-Podgurski, "Design of an Active Power Pulsation Buffer Using an Equivalent Series-Resonant Impedance Model," *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Stanford, CA, 2017 [**Best Paper Award**].

[C.61] Z. Ye, Y. Lei, Z. Liao, R.C.N. Pilawa-Podgurski, "Investigation of Capacitor Voltage Balancing in Practical Implementations of Flying Capacitor Multilevel Converters," *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Stanford, CA, 2017 [**Best Paper Award**].

[C.60] P. Tannous, S. Peddada, J. Allison, T. Foulkes, R. Pilawa, A.G. Alleyne, "Dynamic Temperature Estimation of Power Electronics Systems," *American Control Conference*, Seattle, WA, 2017.

[C.59] C. B. Barth, J. Colmenares, T. Foulkes, K. Coulson, J. Sotelo, T. Modeer, N. Miljkovic, R.C.N. Pilawa-Podgurski, "Experimental Evaluation of a 1 kW, Single Phase, 3-Level Gallium Nitride Inverter in Extreme Cold Environment," *IEEE Applied Power Electronics Conference (APEC)*, Tampa, FL, 2017 [**Best Presentation Award, Barth**].

[C.58] I. Moon, C.F. Haken, E.K. Saathoff, E. Bian, Y. Lei, S. Qin, D. Chou, S. Sedig, W.H. Chung, R.C.N. Pilawa-Podgurski, "Design and Implementation of a 1.3 kW, 7-Level Flying Capacitor Multilevel AC-DC Converter with Power Factor Correction," *IEEE Applied Power Electronics Conference (APEC)*, Tampa, FL, 2017.

[C.57] E. Candan, P.S. Shenoy, R.C.N. Pilawa-Podgurski, "Unregulated Bus Operation of Server-to-Virtual Bus Differential Power Processing for Data Centers," *IEEE Applied Power Electronics Conference (APEC)*, Tampa, FL, 2017 [**Best Presentation Award, Candan**].

[C.56] T. Foulkes, J. Oh, P. Birbarah, J. Neely, N. Miljkovic, R.C.N. Pilawa-Podgurski, "Active Hot Spot Cooling of GaN Transistors With Electric Field Enhanced Jumping Droplet Condensation," *IEEE Applied Power Electronics Conference (APEC)*, Tampa, FL, 2017 [**Best Presentation Award, Foulkes**].

[C.55] T. Modeer, C.B. Barth, N. Pallo, W.H. Chung, T. Foulkes, R.C.N. Pilawa-Podgurski, "Design of a GaN-based, 9-level Flying Capacitor Multilevel Inverter with Low Inductance Layout," *IEEE Applied Power Electronics Conference (APEC)*, Tampa, FL, 2017.

[C.54] Z. Ye, W.-C. Liu, P.S. Shenoy, R.C.N. Pilawa-Podgurski, "Design and Implementation of a Low-cost and Compact Floating Gate Drive Power Circuit for GaN-based Flying Capacitor Multi-Level Converters," *IEEE Applied Power Electronics Conference (APEC)*, Tampa, FL, 2017.

[C.53] A. Stillwell and R.C.N. Pilawa-Podgurski, "A 5-level Flying Capacitor Multi-Level Converter with Integrated Auxiliary Power Supply and Start-up," *IEEE Applied Power Electronics Conference (APEC)*, Tampa, FL, 2017 [**Best Presentation Award, Stillwell**].

- [C.52] W-C Liu, P. Assem, Y. Lei, R.C.N. Pilawa-Podgurski, "A 94.2% peak efficiency 1.53A direct battery hook-up hybrid Dickson switched-capacitor DC-DC converter with wide continuous conversion ratio in 65nm CMOS," *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, 2017.
- [C.51] S. Qin, Y. Lei, I. Moon, C. Haken, E. Bian, E. Saathoff, W. Chung, D. Chou, R.C.N. Pilawa-Podgurski, "A High Power Density Power Factor Correction Front End Based on a 7-Level Flying Capacitor Multilevel Converter," *IEEE Southern Power Electronics Conference*, Auckland, New Zealand, 2016
- [C.50] Z. Ye and R.C.N. Pilawa-Podgurski, "A Power Supply Circuit for Gate Driver of GaN-based Flying Capacitor Multi-level Converters," *IEEE Workshop on Wide Bandgap Power Devices and Applications (WiPDA)*, Fayetteville, AR, 2016.
- [C.49] J. Colmenares, T. Foulkes, C. Barth, T. Modeer, R.C.N. Pilawa-Podgurski, "Experimental Characterization of Enhancement Mode GaN Power FETs at Cryogenic Temperatures," *IEEE Workshop on Wide Bandgap Power Devices and Applications (WiPDA)*, Fayetteville, AR, 2016.
- [C.48] E. Candan, A. Stillwell, R.C.N. Pilawa-Podgurski "A Reliability Assessment of Series-Stacked Servers with Server-to-Bus Differential Power Processing" *IEEE INTELEC*, Austin, TX , 2016.
- [C.47] D. Skarlatos, R. Thomas, A. Agrawal, S. Qin, R.C.N. Pilawa-Podgurski, U.R. Karpuzcug, R. Teodorescu, N.S. Kim, and J. Torrellas "Snatch: Opportunistically Reassigning Power Allocation between Processor and Memory in 3D Stacks", *MICRO*, 2016 (accepted for publication).
- [C.46] S. Qin and R.C.N. Pilawa-Podgurski "Power Density Optimization for Active Decoupling Buffer in Single-phase Converters," *IEEE Energy Conversion Congress and Exposition*, Milwaukee, WI, 2016.
- [C.45] Z. Liao, Y. Lei and R.C.N. Pilawa-Podgurski "A GaN-based Flying-Capacitor Multilevel Boost Converter for High Step-up Conversion," *IEEE Energy Conversion Congress and Exposition*, Milwaukee, WI, 2016 [**Best Paper Award**].
- [C.44] A. Stillwell, D. Heeger and R.C.N. Pilawa-Podgurski "Interleaved 1-to-6 Step-Up Resonant Switched-Capacitor Converter Utilizing Split-Phase Control," *IEEE Energy Conversion Congress and Exposition*, Milwaukee, WI, 2016.
- [C.43] C. Barth, T. Foulkes W.H. Chung, T. Modeer, P. Assem, Y. Lei and R.C.N. Pilawa-Podgurski "Design and Control of a GaN-based, 13-level, Flying Capacitor Multilevel Inverter", *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Trondheim, Norway, 2016 [**Best Paper Award**].
- [C.42] A. Stillwell, Y. Lei and R.C.N. Pilawa-Podgurski "A Method to Extract Low-Voltage Auxiliary Power from a Flying Capacitor Multi-level Converter", *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Trondheim, Norway, 2016.
- [C.41] T. Modeer, C. Barth, Y. Lei and R.C.N. Pilawa-Podgurski "An Analytical Method for Evaluating the Power Density of Multilevel Converters", *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Trondheim, Norway, 2016.
- [C.40] Y. Lei, C. Barth, S. Qin, W.-C. Liu, I. Moon, A. Stillwell, D. Chou, T. Foulkes, Z. Ye, Z. Liao and R.C.N. Pilawa-Podgurski "A 2 kW, Single-Phase, 7-Level, GaN Inverter with an Active Energy Buffer Achieving 216 W/in³ Power Density and 97.6% Peak Efficiency", *IEEE Applied Power Electronics Conference*, Long Beach, CA, 2016 [**Best Presentation Award, Lei**].

- [C.39] C. Barth, I. Moon, Y. Lei, S. Qin and R.C.N. Pilawa-Podgurski “Experimental Evaluation of Capacitors for Power Buffering in Single-Phase Power Converters,” *IEEE Energy Conversion Congress and Exposition*, Montreal, Canada, 2015.
- [C.38] Y. Cao, Y. Lei, R.C.N. Pilawa-Podgurski and P. Krein “Modular Switched-Capacitor Dc-Dc Converters Tied with Lithium-ion Batteries for Use in Battery Electric Vehicles,” *IEEE Energy Conversion Congress and Exposition*, Montreal, Canada, 2015.
- [C.37] E. Candan, D. Heeger, P.S. Shenoy and R.C.N. Pilawa-Podgurski “A Series-Stacked Power Delivery Architecture with Hot-Swapping for High-Efficiency Data Centers,” *IEEE Energy Conversion Congress and Exposition*, Montreal, Canada, 2015.
- [C.36] S. Qin, R. Serna and R.C.N. Pilawa-Podgurski “A Data-driven Approach to the Design of Photovoltaic Maximum Power Point Tracking Techniques Using Field Transient Data,” *IEEE Energy Conversion Congress and Exposition*, Montreal, Canada, 2015.
- [C.35] S. Qin, Y. Lei, C. Barth, W.C. Liu and R.C.N. Pilawa-Podgurski “A High-Efficiency High Energy Density Buffer Architecture for Power Pulsation Decoupling in Grid-Interfaced Converters,” *IEEE Energy Conversion Congress and Exposition*, Montreal, Canada, 2015.
- [C.34] Y. Lei, Z. Ye and R.C.N. Pilawa-Podgurski “A GaN-based 97% Efficient Hybrid Switched-Capacitor Converter with Lossless Regulation Capability,” *IEEE Energy Conversion Congress and Exposition*, Montreal, Canada, 2015.
- [C.33] A. Stillwell and R.C.N. Pilawa-Podgurski “A Resonant Switched-Capacitor Converter with GaN Transistors for Series-Stacked Processors with 99.8% Power Delivery Efficiency,” *IEEE Energy Conversion Congress and Exposition*, Montreal, Canada, 2015.
- [C.32] Y. Lei, W-C, Liu and R.C.N. Pilawa-Podgurski “An Analytical Method to Evaluate Flying Capacitor Multilevel Converters and Hybrid Switched-Capacitor Converters for Large Voltage Conversion Ratios,” *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Vancouver, BC 2015.
- [C.31] S. Qin, Y. Lei, C.B. Barth, W-C, Liu and R.C.N. Pilawa-Podgurski “Architecture and Control of a High Energy Density Buffer for Power Pulsation Decoupling in Grid-Interfaced Applications” *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Vancouver, BC 2015 [**Best Paper Award**].
- [C.30] E. Candan, P. Shenoy and R.C.N. Pilawa-Podgurski “A Distributed Bi-directional Hysteresis Control Algorithm for Server-to-Virtual Bus Differential Power Processing” *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Vancouver, BC 2015.
- [C.29] B. Macy, Y. Lei, R.C.N. Pilawa-Podgurski, “A 1.2 MHz, 25 V to 100 V GaN-based Resonant Dickson Switched-Capacitor Converter with 1011 W/in³ (61.7 kW/L) Power Density,” *IEEE Applied Power Electronics Conference*, Charlotte, NC, 2015.
- [C.28] S. J. Kim, R. K. Nandwana, Q. Khan, R. Pilawa-Podgurski, P. K. Hanumolu “A 1.8V 30-to-70MHz 87% Peak-Efficiency 0.32 mm² 4-Phase Time-Based Buck Converter Consuming 3 μ A/MHz Quiescent Current in 65nm CMOS,” *IEEE International Solid-State Circuits Conference (ISSCC) 2015*.
- [C.27] E. Candan, P. Shenoy and R.C.N. Pilawa-Podgurski “A Series-Stacked Power Delivery Architecture with Isolated Differential Power Conversion for Data Centers,” *IEEE INTELEC*, Vancouver, BC, 2014.

- [C.26] J. McClurg, P. Shenoy and R.C.N. Pilawa-Podgurski “A Series-Stacked Architecture for High-Efficiency Data Center Power Delivery,” *IEEE Energy Conversion Congress and Exposition*, Pittsburgh, PA, 2014.
- [C.25] A. Ho, M. Schuck and R.C.N. Pilawa-Podgurski “Asymmetric Interleaving in Low-Voltage CMOS Power Management with Multiple Supply Rails,” *IEEE Energy Conversion Congress and Exposition*, Pittsburgh, PA, 2014.
- [C.24] R.C. Bell and R.C.N. Pilawa-Podgurski “Asynchronous and Distributed Maximum Power Point Tracking of Series-Connected Photovoltaic Sub-Modules Using Differential Power Processing,” *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Santander, Spain 2014.
- [C.23] Y. Lei, R. May and R.C.N. Pilawa-Podgurski “Split-Phase Control: Achieving Complete Soft-Charging Operation of a Dickson Switched-Capacitor Converter,” *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)* Santander, Spain, 2014 [**1st Prize Best Paper Award**].
- [C.22] Y. Lei and R.C.N. Pilawa-Podgurski “Soft-charging Operation of Switched-capacitor DC-DC Converters with an Inductive Load,” *IEEE Applied Power Electronics Conference*, Fort Worth, TX, 2014.
- [C.21] S. Qin, A. Morrison, and R.C.N. Pilawa-Podgurski “Enhancing Micro-inverter Energy Capture with Sub-module Differential Power Processing,” *IEEE Applied Power Electronics Conference*, Fort Worth, TX, 2014 [**1st Prize Student Demonstration Winner**].
- [C.20] C. Barth and R.C.N. Pilawa-Podgurski “Dithering Digital Ripple Correlation Control with Digitally-Assisted Windowed Sensing for Solar Photovoltaic MPPT,” *IEEE Applied Power Electronics Conference*, Fort Worth, TX, 2014 [**Best Presentation Award, Barth**].
- [C.19] M. Schuck and R.C.N. Pilawa-Podgurski “Ripple Minimization in Asymmetric Multiphase Interleaved dc-dc Switching Converters,” *IEEE Energy Conversion Congress and Exposition*, Denver, CO 2013.
- [C.18] S. Qin, S.T. Cady, A.D Dominguez-Garcia and R.C.N. Pilawa-Podgurski “A Distributed Approach to MPPT for PV Sub-Module Differential Power Processing,” *IEEE Energy Conversion Congress and Exposition*, Denver, CO, 2013.
- [C.17] M. Schuck and R.C.N. Pilawa-Podgurski “Input current ripple reduction through interleaving in single-supply multiple-output dc-dc converters,” *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Salt Lake City, UT, 2013.
- [C.16] Y. Lei and R.C.N. Pilawa-Podgurski “Analysis of Switched-capacitor DC-DC Converters in Soft-charging Operation,” *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Salt Lake City, UT, 2013.
- [C.15] C. Barth and R.C.N. Pilawa-Podgurski “Implementation of Dithering Digital Ripple Correlation Control for PV Maximum Power Point Tracking,” *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*, Salt Lake City, UT, 2013 [**Best Paper Award**].
- [C.14] S. Qin, K.A. Kim and R.C.N. Pilawa-Podgurski “Laboratory Emulation of A Photovoltaic Module for Controllable Insolation and Realistic Dynamic Performance,” *IEEE Power and Energy Conference at Illinois (PECI)*, Urbana, IL, 2013.

- [C.13] M. Schuck and R.C.N. Pilawa-Podgurski “Current Ripple Cancellation for Asymmetric Multiphase Interleaved dc-dc Switching Converters,” *IEEE Power and Energy Conference at Illinois (PECI)*, Urbana, IL, 2013 [**Best Paper Award**].
- [C.12] J. McClurg, Y. Zhang, J. Wheeler, and R.C.N. Pilawa-Podgurski “Re-Thinking Data Center Power Delivery: Regulating Series-Connected Voltage Domains in Software,” *IEEE Power and Energy Conference at Illinois (PECI)*, Urbana, IL, 2013.
- [C.11] C. Barth and R.C.N. Pilawa-Podgurski “Dithering Digital Ripple Correlation Control for Photovoltaic Maximum Power Point Tracking,” *IEEE Power and Energy Conference at Illinois (PECI)*, Urbana, IL, 2013.
- [C.10] S. Qin, and R.C.N. Pilawa-Podgurski, “Sub-Module Differential Power Processing for Photovoltaic Applications,” *IEEE Applied Power Electronics Conference*, Long Beach, CA, 2013.
- [C.9] R. Serna, B.J. Pierquet, J. Santiago, R.C.N. Pilawa-Podgurski, “Field Measurements of Transient Effects in Photovoltaic Panels and its Importance in the Design of Maximum Power Point Tracker,s” *IEEE Applied Power Electronics Conference*, Long Beach, CA, 2013.
- [C.8] R.C.N. Pilawa-Podgurski, D.J. Perreault “Sub-Module Integrated Distributed Maximum Power Point Tracking for Solar Photovoltaic Applications,” *IEEE Energy Conversion Congress and Exposition*, Raleigh, NC, 2012.
- [C.7] R.C.N. Pilawa-Podgurski, D.J. Perreault “Integrated Two-Stage Power Converter with Soft Charging Switched-Capacitor Operation in 180 nm CMOS,” *IEEE European Solid-State Circuits Conference* Helsinki, Finland, 2011.
- [C.6] R.C.N. Pilawa-Podgurski, W. Li, I. Celanovic, D.J. Perreault “Integrated CMOS DC-DC Converter with Digital Maximum Power Point Tracking for a Portable Thermophotovoltaic Power Generator,” *IEEE Energy Conversion Congress and Exposition*, Phoenix, AZ, 2011. [**Best Presentation Award, Pilawa**]
- [C.5] W. Chan, P. Bermel, R. Pilawa-Podgurski, C. Marton, K. Jensen, M. Soljacic, J. Joannopoulos, I. Celanovic “A High-Efficiency Millimeter-Scale Thermophotovoltaic Generator,” *TPV-9 World Conference at the 25th European Photovoltaic Solar Energy Conference and Exhibition*, Valencia, Spain, 2010.
- [C.4] R.C.N Pilawa-Podgurski, N. Pallo, W. Chan, D.J. Perreault, and I. Celanovic, “Low Power Maximum Power Point Tracker with Digital Control for Thermophotovoltaic Generators,” *IEEE Applied Power Electronics Conference*, Palm Springs, CA, 2010. [**Best Presentation Award, Pilawa**]
- [C.3] D.J. Perreault, J. Hu, J.M. Rivas, Y. Han, O. Leitermann, R.C.N. Pilawa-Podgurski, A. Sagneri, and C.R. Sullivan, “Opportunities and Challenges in Very High Frequency Power Conversion,” *IEEE Applied Power Electronics Conference*, Washington, D.C. 2009.
- [C.2] R.C.N. Pilawa-Podgurski, D.M. Giuliano, and D.J. Perreault “Merged Two-Stage Power Converter Architecture with Soft Charging Switched-Capacitor Energy Transfer,” *IEEE Power Electronics Specialists Conference*, Rhodes, Greece, 2008.
- [C.1] R.C.N. Pilawa-Podgurski, A.D. Sagneri, J.M. Rivas, D.I. Anderson, and D.J. Perreault, “Very High Frequency Resonant Boost Converters,” *IEEE Power Electronics Specialists Conference*, Orlando, FL, 2007.

WORKSHOP PROCEEDINGS

C. Barth, R.C.N. Pilawa-Podgurski et al., “Experimental Characterization of Gallium-Nitride Power Field-Effect Transistors at Cryogenic Temperatures and Application in Multilevel Inverter,” *Cryogenic Engineering Conference and International Cryogenic Materials Conference*, Madison, WI, 2017

R.C.N. Pilawa-Podgurski “Scalable Series-stacked Power Delivery Architectures for Improved Efficiency and Reduced Supply Current,” *IEEE International Workshop on Power Supply on Chip (PwrSoC)*, Boston, MA, 2014 **[Invited]**

R.C.N. Pilawa-Podgurski “Soft Charging Operation of Switched-Capacitor Converters – Increasing Power Density and Efficiency,” *IEEE ECCE – Special Session: Recent Advances in Switched Capacitor Circuits I*, Raleigh, NC, 2012 **[Invited]**

R.C.N. Pilawa-Podgurski “Soft Charging Switched Capacitor CMOS Power Converters - Increasing Efficiency and Power Density Using a Merged Two-Stage Architecture,” *IEEE International Workshop on Power Supply on Chip (PwrSoC)*, San Francisco, CA, 2012 **[Invited]**

BOOK CHAPTERS

[B.1] R.C.N. Pilawa-Podgurski and Y. Lei, “Circuit Techniques for Improving the Power Density of Switched-Capacitor Converters,” in *Power Management Integrated Circuits and Technologies*, M. Hella (editor), Taylor & Francis, London, 2016

PATENTS

“Distributed Maximum Power Point Tracking in Differential Power Processing”. Inventors: Robert Pilawa-Podgurski, Alejandro Dominguez-Garcia, Shibin Qin, Stanton Cady. U.S. Patent Pending

”Systems and Methods for Photovoltaic String Protection”. Inventors: Phil Krein, Robert Pilawa-Podgurski, Katherine Kim. U.S. Patent Pending

“Power Processing Methods and Apparatus for Photovoltaic Systems”. Inventors: David Perreault, Robert Pilawa-Podgurski, Charles Sullivan, Alexander Latham. U.S. Patent No. 9,673,729

“Thermophotovoltaic Energy Generation”. Inventors: Ivan Celanovic, Walker Chan, Peter Bermel, Adrian Yeng, Christopher Marton, Michael Ghebrehbrhan, Mohammad Araghchini, Klavs Jensen, Marin Soljacic, John Joannopoulos, Steven Johnson, Robert Pilawa-Podgurski, Peter Fisher. U.S. Patent No. 9,116,537

“Power Converter with Capacitive Energy Transfer and Fast Dynamic Response”. Inventors: David J. Perreault, Robert Pilawa-Podgurski, David Giuliano. U.S. Patent No. 9,048,727

“Resonant dc-dc Boost Converter”. Inventors: David J. Perreault, Juan Rivas, Anthony Sagneri, Olivia Leiternann, Yehui Han, Robert Pilawa-Podgurski. U.S. Patent No.: 7,889,519

THESES

Robert C.N. Pilawa-Podgurski, “Architectures and Circuits for Low-Voltage Energy Conversion and Applications in Renewable Energy and Power Management”, Ph.D. Thesis, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, 2012

Robert C.N. Pilawa-Podgurski, “Design and Evaluation of a Very High Frequency dc/dc Converter”, M.Eng. Thesis, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, 2007

SERVICE ACTIVITY

EDITORIAL AND REVIEWER SERVICE

- 2014 – present Associate Editor, *IEEE Transactions on Power Electronics*
- 2014 – present Associate Editor, *IEEE Journal of Emerging and Selected Topics in Power Electronics*
- 2014 Guest Associate Editor, *IEEE Journal of Emerging and Selected Topics in Power Electronics - Special Issue on Sustainable Energy Systems Integration*
- 2012 – present Review Panel, Energy, Power and Adaptive System, National Science Foundation
- 2012 Proposal Reviewer, 21st Century Fund, State of Indiana
- 2010 – present Reviewer *IEEE Transactions on Power Electronics, IEEE Journal of Emerging and Selected Topics in Power Electronics, IEEE Transactions on Industry Applications, IEEE Journal of Solid-State Circuits, IEEE Transactions on Industrial Electronics, IEEE Transactions on Sustainable Energy, IEEE Transactions on Very Large Scale Integration, IEEE Applied Power Electronics Conference, IEEE European Conference on Power Electronics, IEEE Applied Power Electronics Conference, IEEE Energy Conversion Congress and Exposition IEEE International Symposium on Power Electronics and Distributed Generation*

PROFESSIONAL SERVICE

- 2016 - Member, *Administrative Committee (AdCom), IEEE Power Electronics Society*
- 2016 - Chair, *Power Conversion Systems and Components Committee, IEEE Power Electronics Society*
- 2016 Technical Program Committee Member – Track Chair: Power Electronics Applications, *IEEE Applied Power Electronics Conference (APEC)*
- 2016 Technical Program Co-Chair – *IEEE 4th Workshop on Wide Bandgap Power Devices and Applications (WiPDA)*
- 2016 Technical Program Committee Member – Student Activities co-Chair, *IEEE Energy Conversion Congress and Exposition (ECCE)*
- 2015 Technical Program Committee Member - Vice Chair Track I: Components, Package, Material and Other Enabling Technologies, *IEEE Energy Conversion Congress and Exposition (ECCE)*
- 2015 Technical Program Committee Member – Track Chair: Power Electronics Applications, *IEEE Applied Power Electronics Conference (APEC)*
- 2015 – present Faculty Advisor – IEEE International Future Energy Challenge, leads team of 5 undergraduate and 2 graduate students in hardware development
- 2015 – present Faculty Advisor – University of Illinois Solar Decathlon Team
- 2015 – present Faculty Advisor – University of Illinois Solar Car Team
- 2014 Invited Member - Long Range Planning Committee Meeting, *IEEE Power Electronics Society*
- 2012 - present IEEE APEC, Session Chair
- 2012 - present Faculty Advisor and Track Chair *IEEE Power and Energy Conference at Illinois*

- 2014 - present Award Chair (elected) - *High Performance and Emerging Technologies Committee, IEEE Power Electronics Society*
- 2013 - 2016 Secretary, *Power Conversion Systems and Components Committee, IEEE Power Electronics Society*
- 2012 – present Member - *High Performance and Emerging Technologies Committee, IEEE Power Electronics Society*
- 2012 - present Member - *Sustainable Energy Systems Committee, IEEE Power Electronics Society*
- 2012 - present Member - *Power & Control Core Technologies, IEEE Power Electronics Society*
- 2012 - present Member - *Power Conversion Systems and Components Committee, IEEE Power Electronics Society*
- 2014 IEEE ECCE Technical Program Committee Member - Topic Chair for Smart Grid & Utility Applications
- 2014 IEEE ECCE Session Chair – Stability and Quality I, Stability and Quality III, Power Electronics Modules III
- 2013 IEEE ECCE Technical Program Committee Member - Topic Chair for Computer/Telecommunication Applications and Power
- 2013 ECCE Session Chair - DC-DC Non-Isolated I, Passive Components, Wide Bandgap Semiconductors III
- 2013 Technical Committee Member *IEEE Workshop on Wide Bandgap Power Devices and Applications*
- 2013 Track Chair – Power Electronics, IEEE North American Power Symposium
- 2012 Technical Program Committee Member - Topic Chair for Components, Package, material and Other Enabling Technologies IEEE Energy Conversion Congress and Exposition
- 2012 Session Chair - Passive Components for High Frequency Power Conversion

UNIVERSITY COMMITTEES AND SERVICE

- 2016 – present Faculty Advisor, IEEE PELS/PES/IAS Student Chapter
- 2015 – present Faculty Advisor, IEEE International Future Energy Challenge Student Competition
- 2015 – present Faculty Advisor and ECE Liaison, UIUC Solar Decathlon Team
- 2015 – present Faculty Advisor, UIUC Solar Car Team
- 2015 – present ECE Graduate Recruitment Commitment – Chair
- 2014 – present ECE Advisory Committee (elected position of rank Assistant Professor)
- 2012 – present ECE Power and Energy Committee
- 2012 – 2015 ECE Colloquium Committee
- 2012 – 2015 ECE Graduate Affairs Committee
- 2012 – present ECE Graduate Recruitment Committee (serving as chair since 2015)
- 2012 – 2014 Faculty Advisor, UIUC Society of Women Engineers special project on renewable energy integration
- 2012 – present Undergraduate Mentoring, approximately 35 students each semester
- 2012 – present Various undergraduate seminar presentations: ECE Explorations, State-of-the-department review, ECE Tech. Fair, etc.

STUDENT AND POST-DOC ADVISING

CURRENT POST-DOCS – MAJOR ADVISOR

Dr. Tomas Modeer Ph.D. KTH 2015, post-doc appointment: 2016-2018

CURRENT GRADUATE STUDENTS – MAJOR ADVISOR

Enver Candan M.S. 2014, Ph.D. ECE, expected 2018

Christopher Barth M.S. 2014, Ph.D. ECE, expected 2018

Wen-Chuen (Joseph) Liu Ph.D. ECE, expected 2018

Pourya Assem Ph.D. ECE, expected 2019

Andrew Stillwell M.S. 2015, Ph.D. ECE, expected 2019

Zichao Ye M.S. 2016, Ph.D. ECE, expected 2020

Derek Chou M.S. 2017, Ph.D. ECE, expected 2021

Thomas Foulkes M.S. 2017, Ph.D. ECE, expected 2021

Zitao Liao M.S. 2017, Ph.D. ECE, expected 2021

Yizhe Zhang M.S. ECE, expected 2017

Nathan Pallo M.S. ECE, expected 2018

Nathan Brooks M.S. ECE, expected 2018

Pei Ng M.S. ECE, expected 2018

Samantha Coday M.S. ECE, expected 2019

Margaret Blackwell M.S. ECE, expected 2019

VISITING GRADUATE STUDENTS

Juan Colmenares Spring 2016

HOME INSTITUTION

KTH – Sweden

PREVIOUS GRADUATE STUDENTS – MAJOR ADVISOR

Yutian Lei Ph.D. ECE, 2017

Shibin Qin M.S. 2014, Ph.D. ECE 2017

Joshua Garcia Sheridan M.S. ECE studies

Felix Hsiao M.S. ECE, 2016

Derek Heeger M.S. ECE, 2016

Aaron Ho M.S. ECE, 2015

Ben Macy M.S. ECE, 2015

Yuqi Li M.S. ECE, 2015

Roy Bell M.S. ECE, 2014

Josiah McClurg M.S. ECE, 2014

Marcel Schuck M.S. ECE, 2013

Ryan May M.S. ECE, 2013

CURRENT POSITION

Tesla Motors

Apple

Virginia Tech, PhD program

Sandia National Laboratories

U.S. Patent and Trademark Office

Microsoft

Texas Instruments

Univ. of Minnesota, PhD program

University of Iowa, PhD program

ETH, PhD Program

Texas Instruments

UNDERGRADUATE RESEARCH ADVISOR

B.S Thesis Supervisor:

Intae Moon B.S. ECE, 2016

Thomas Navidi B.S. ECE, 2016

Benedict Foo B.S. ECE, 2015

Rodrigo Serna B.S. ECE, 2014

Jingyi Ma B.S. ECE, 2014

MIT, PhD program

Stanford University, PhD program

Dartmouth College, PhD program

Citibank Investments

USC, M.S program

| | | |
|---------------------|----------------|-----------------------------------|
| Yujia Zhang | B.S. ECE, 2014 | Stanford University, M.S. program |
| Felix Hsiao | B.S. ECE, 2014 | UIUC, M.S program |
| Ziming Chen | B.S. ECE, 2013 | |
| Sutchaya Lertburapa | B.S. ECE, 2013 | Foxconn |
| Sartaj Grewal | B.S. ECE, 2013 | UIUC, M.S. program |
| Christopher Barth | B.S. ECE, 2012 | UIUC, PhD program |

Undergraduate Independent Research Supervisor:

Jihyun Lee (2017 – present), Adwaita Dani (2017 – present), Anika Manzo (2017 – present) Michelle Rentauskas (2016 – present), Amalia Dungey (2016 – present), Sunyu Wang (2016 – present), Won Ho Chung (2016 – 2017), Carl Haken (2015 – 2016, Space X), Eli Jenkin (2015-16), Erik Saathoff (2015-present), Ethan Bian (2015-present), Steven Sedig (2015-2016), Nick Alexander (2015-2016, GE), Mark Hirsbrunner (2014-15), Corinne Cannavale (2013-2015), Brady Salz (2014, UIUC M.S. program), Emma He (2014), Chenyang Xu (2013, UC Berkeley M.S program), Andrew Morrison (2013-2014, ETH M.S program), Ruichen Zhao (2013, UNSW PhD program), Jeff Wheeler (2012-2013, Stanford M.S. program), Charles Wu (2012-2013)

TEACHING EXPERIENCE

| UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN | | <u>EVAL. SCORE</u> |
|---|---|--------------------|
| 2017 | ECE 598RPP – Topics in Power Electronics (graduate-level, 19) | N/A yet |
| 2016 | ECE 464 – Power Electronics (senior-level, 101 students) | 5.0/5.0 |
| 2016 | ECE 469 – Power Electronics Laboratory (senior-level), 50 students | 4.9/5.0 |
| 2016 | ECE 598RPP – Advanced Power Electronics (graduate-level, 21 students) | 5.0/5.0 |
| 2015 | ECE 464 – Power Electronics (senior-level, 106 students) | 4.9/5.0 |
| 2015 | ECE 469 – Power Electronics Laboratory (senior-level), 54 students | 4.9/5.0 |
| 2014 | ECE 598RPP – Advanced Power Electronics (graduate-level, 22 students) | 4.7/5.0 |
| 2013 | ECE 464 – Power Electronics (senior-level, 91 students) | 4.7/5.0 |
| 2013 | ECE 469 – Power Electronics Laboratory (senior-level, 60 students) | 4.7/5.0 |
| 2012 | ECE 464 – Power Electronics (senior-level, 88 students) | 4.9/5.0 |
| 2012 | ECE 469 – Power Electronics Laboratory (senior-level, 48 students) | 4.9/5.0 |
| 2012 | ECE 330 – Power Circuits and Electromechanics (junior-level, 78 students) | 4.5/5.0 |
| MASSACHUSETTS INSTITUTE OF TECHNOLOGY | | |
| 2011 | Teaching Assistant, 6.334 – Power Electronics (graduate-level, 51 students) | 6.3/7.0 |
| 2005 | Laboratory Assistant, 6.685 – Electric Machines (graduate-level, 18 students) | |
| 2005-2011 | Graduate Resident Tutor, MacGregor House | |

OTHER EDUCATIONAL ACTIVITIES

WORKSHOPS

| | |
|------|--|
| 2016 | Participant and Invited Speaker, NSF Power Electronics Workshop, Arlington, VA |
| 2016 | Participant and Invited Speaker, IEEE International Future Energy Challenge Workshop, Taipei, Taiwan |

- 2016 Participant, Air Force Office of Scientific Research Annual Review, Software & Systems, Arlington, VA
- 2016 Participant, AFOSR/Sandia Technical Exchange on UWBG Semiconductors: Research Opportunities and Directions, Arlington, VA
- 2015 Participant, ONR Workshop on Power Electronics Control in Future Electric Ships, Tallahassee, Florida
- 2015 Invited Participant, IEEE Power Electronics Society Future of Electronic Power Processing and Conversion, Milan, Italy
- 2014 Participant, NSF/ONR Faculty/Industry workshop to reform energy systems education: Electric Energy Systems Curriculum, Napa Valley, CA
- 2013 Participant in Middle School Educational Workshop, iRISE, presented educational material on renewable energy “Solar Photovoltaics – An overview”, Urbana, IL
- 2012 Participant, NSF/ONR Workshop to reform energy systems education: Electric Energy Systems Curriculum for Sustainability, Napa Valley, CA

COURSE DEVELOPMENT

- 2014 Developed syllabus and course notes for ECE 598RPP – Advanced Power Electronics, a graduate-level course offered for the first time in spring 2014 (enrollment: 24)
- 2013 Developed two new laboratory experiments for ECE 469 – Power Electronics Laboratory (analog feedback control, and PWM generation circuitry)
- 2012 Developed educational curriculum for middle school power and energy teaching/lab modules, S. Purandare, S. Qin, S.-V. Dhople, A. Dominguez-Garcia, R. Pilawa, and L. L. Goddard, ”Harnessing Energy”, L. L. Goddard, editor. Creative Commons, 2012

CONSULTING

Consulting experience for patent litigation, expert review, product development, and market analysis in all areas of power electronics. Incomplete list of clients: Tower Manufacturing, Sandia National Laboratories, Seaborough Research, Skyworks Solutions.

INVITED TALKS

- 2017 “Powering a Sustainable Society – Energy Conversion Systems for Electric Transportation and Grid Integration of Renewables”, University of California, Berkeley
- 2017 “Hybrid Switched-Capacitor Circuit Topologies for Non-Isolated Point-of-Load Conversion”, MCCI Research Workshop, Tyndall Institute, Cork, Ireland
- 2017 “High Power Density, High Efficiency Power Electronics”, ABB Corporate Research, Västerås, Sweden

- 2016 “Power electronics in telecom and computation applications”, National Science Foundation Power Electronics Workshop, Arlington, VA.
- 2016 “Extreme power density and efficiency power converters for grid-interfaced applications - new circuit topologies and control techniques to leverage wide band-gap semiconductor devices”, Caltech, Pasadena, CA.
- 2016 “New Topologies and Control Methods for Extreme Power Density Inverters: A Google/IEEE Little Box Challenge Case Study”, ARPA-E CIRCUITS workshop, Washington, D.C.
- 2016 “Tackling the Little Box Challenge - New circuit architectures and control methods to achieve a 216 W/in³ power density 2 kW inverter”, National Taiwan University, Taipei, Taiwan
- 2016 “Tackling the Little Box Challenge - New circuit architectures to achieve a 216 W/in³ power density 2 kW inverter”, IEEE Power Electronics Society Webinar, 571 live attendees.
- 2016 “Tackling the Little Box Challenge - New circuit architectures and control methods to achieve a 216 W/in³ power density 2 kW inverter”, KTH – Royal Institute of Technology, Stockholm, Sweden
- 2016 “High Performance Power Converters for Electric Transportation and Grid-Interfaced Power Converters”, Delphi Automotive, Kokomo, IN
- 2016 “Powering a Sustainable Society – Energy Conversion Systems for Electric Transportation and Grid Integration of Renewables”, Massachusetts Institute of Technology, Cambridge, MA
- 2016 “A 98% efficient, 2 kW, 7-level flying capacitor multi-level inverter and series-stacked buffer converter for the Google Little Box Challenge” Kilby Laboratory, Texas Instruments, Dallas, TX
- 2015 “A 98% efficient, 205 W/in³, 2 kW, 7-level flying capacitor multi-level inverter and series-stacked buffer converter for the Google Little Box Challenge” Google/IEEE Little Box Challenge Finalist Symposium, National Renewable Energy Laboratory, Golden, CO
- 2015 “Extreme Efficiency and Compact Power Electronics: From Solar Photovoltaics to Data Centers”, University of Wisconsin, Madison, WI
- 2015 “Next Generation Power Electronics for Extreme Efficiency and High Power Density Applications”, Massachusetts Institute of Technology, Cambridge, MA
- 2015 “Power Electronics for Extreme Efficiency and Power Density with Applications in Data Centers, Solar Photovoltaics, and Electric Vehicles”, Stanford University, Stanford, CA
- 2015 “Power Electronics for Extreme Efficiency and Power Density with Applications in Data Centers, Solar Photovoltaics, and Electric Vehicles”, University of Colorado Boulder – Colorado Power Electronics Center, Boulder, CO
- 2015 “Power Electronics for Extreme Efficiency and Power Density with Applications in Data Centers, Solar Photovoltaics, and Electric Vehicles”, KTH – Royal Institute of Technology, Stockholm, Sweden
- 2014 “Applications of High Performance Power Electronics from Smartphones to Solar Photovoltaics” KTH – Royal Institute of Technology, Stockholm, Sweden

- 2014 “Recent Advances in High Performance Switched-Capacitor Power Converters”, Grid Integration Workshop, Google, Mountain View, CA
- 2013 “Opportunities for Power Electronics in Solar Photovoltaics” Energy Foundry/Ameren, Urbana, IL
- 2013 “Advanced Digital Control Techniques in Power Electronics – from Smart-phones to Solar Photovoltaics,” Massachusetts Institute of Technology, Cambridge, MA
- 2013 “Advanced Digital Control Techniques in Power Electronics – from Smart-phones to Solar Photovoltaics,” Northeastern University, Boston, MA
- 2013 “Power Electronics for Low-Voltage Energy Conversion with Applications in Energy Harvesting and CMOS Power Management,” Army Research Laboratory, Adelphi, MD
- 2013 “Opportunities in Solar PV, Low- Voltage Power Delivery, and Next Generation Power Converters” Fairchild Semiconductor, San Jose, CA
- 2013 “Data Center Power Delivery with Series-Stacked Voltage Domains - Improving Efficiency, Reliability, and Power Density” Google, Mountain View, CA
- 2012 “Soft Charged Switched-Capacitor DC-DC Converters: A New Architecture for High Power Density CMOS Power Delivery,” Draper Laboratory, Cambridge, MA
- 2012 “Module-Integrated Power Electronics for Solar Photovoltaics,” 33rd Annual Power Affiliates Review, Urbana, IL
- 2012 “Asymmetric Phase-Shift Techniques for Multi-Phase CMOS Power Management,” Texas Instruments, Dallas, TX
- 2011 “Next Generation Power Electronics Architectures,” Jones Seminar, Thayer School of Engineering, Dartmouth College, Hanover, NH
- 2011 “Next Generation Power Electronics Architectures,” EE Seminar, University of Michigan, Ann Arbor, MI
- 2011 “Next Generation Power Electronics Architectures,” ECE Seminar, University of Illinois Urbana-Champaign, Urbana, IL
- 2010 “Power Conversion Interface for Low-Voltage Photovoltaic and Thermophotovoltaic Sources,” MIT MTL/MITEI Workshop on Next Generation Microenergy Systems, Cambridge, MA
- 2010 “Power Electronics Circuitry for Low-Power Portable Thermophotovoltaic Generator Systems,” Texas Instrument, Dallas, TX
- 2010 “Power Electronics for Photovoltaic Applications – Improving Energy Capture with Intelligent Electronic Design,” MIT Solid State Solar Thermal Energy Conversion (S3 TEC) Workshop, Cambridge, MA
- 2010 “A Merged Two-Stage Converter Architecture for Low-Voltage Power Delivery,” Qualcomm San Diego, CA
- 2009 “Integrated Power Electronics for Solar Photovoltaics and Thermophotovoltaics,” MIT Institute for Soldier Nanotechnologies TPV Workshop, Cambridge, MA

- 2008 Multi-Stage Converter Architectures for Microprocessor Power Delivery,” Interconnect Focus Center Annual Review Atlanta, GA
- 2006 “Design and Evaluation of a 110 MHz dc-dc Converter,” MIT/Industry Consortium on Advanced Automotive Electrical/Electronic Components and Systems Paris, France
- 2006 “Developments in Very High Frequency Power Conversion,” MIT/Industry Consortium on Advanced Automotive Electrical/Electronic Components and Systems Tokyo, Japan

RESEARCH GRANTS

| Award Period | Title | Sponsor | Total Amount (my share) | # of PIs, and lead PI |
|--------------|---|---------------------------|---|-----------------------|
| 2017-2018 | Integrated Jumping Droplet Vapor Chamber Inverter Cooling | NSF/POETS | \$136,000 (\$68,000) | 2, Nenad Miljkovic |
| 2017-2018 | Ultra-compact Bi-directional 6.6 kW EV Charger | NSF/POETS | \$100,000 (\$90,000) | 3, Robert Pilawa |
| 2017 | High Power Density Active Filtering in Power Factor Correction Circuits | Texas Instruments | \$15,000 (\$15,000) Unrestricted gift | 1, Robert Pilawa |
| 2017 | Single Stage Line to 48 V Flying Capacitor Multi-Level Converter with PFC | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |
| 2017 | Combined Thermal and Electrical Design for High Density Power Converters in Electric Vehicles | Toyota Research Institute | \$50,000 (\$25,000) | 2, Robert Pilawa |
| 2017-2018 | Integration of High Power Density Power Converters with Next-Generation GaN Devices and Optimized Manifolded Air Cooling Channels | CRRC | \$303,631 (\$125,000) | 3, Robert Pilawa |
| 2016-2018 | 3D Integration of High Power Density Inverter and Microfluidic Cooling (Cold-Plate) System | NSF/POETS | \$297,934 (\$157,934) | 2, Robert Pilawa |
| 2016-2017 | Discretionary Research Funding | Power Affiliates Program | \$50,000 (\$6,250) | 8, Pete Sauer |
| 2016-2017 | High Power Density Active Filtering in Power Factor Correction Circuits | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |
| 2016-2017 | Compact and Efficient Gate Driving Circuits for Multi-Level Converters | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |
| 2016-2017 | Compact and Efficient Gate Driving Circuits for Multi-Level Converters | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |

| | | | | |
|-----------|---|---|---|--------------------|
| 2016-2018 | Design and Evaluation of GaN-based Inverters in Extreme Cold Environments | NASA | \$73,727 (\$73,727) | 1, Robert Pilawa |
| 2016-2018 | Advanced Thermal Management for High Power Density Electronics | Sandia National Laboratories | \$240,000 (\$120,000) | 2, Nenad Miljkovic |
| 2016-2017 | Combined Fast Charger and Active Battery Management for Li-Ion Batteries | Sandia National Laboratories | \$70,000 (\$70,000) | 1, Robert Pilawa |
| 2016-2018 | Modular and Scalable High Efficiency Power Inverters for Extreme Power Density Applications | NASA | \$499,793 (\$375,000) | 3, Robert Pilawa |
| 2015-2017 | High Power Density Inverter Architectures | NSF/POETS | \$152,656 (\$152,656) | 1, Robert Pilawa |
| 2015-2018 | Power Electronics Architectures for Extreme Efficiency Data Centers | National Science Foundation | \$376,326 (\$376,326) | 1, Robert Pilawa |
| 2015-2018 | Cross-Layer Design of Power Delivery and Load Balancing for Green Data Centers | National Science Foundation | \$498,687 (\$300,000) | 2, Robert Pilawa |
| 2015-2016 | Discretionary Research Funding | Power Affiliates Program | \$50,000 (\$6,250) | 8, Pete Sauer |
| 2015-2016 | Extreme Power Density Inverter Architectures | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |
| 2015-2016 | High Efficiency Power Delivery for Data Centers | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |
| 2015-2016 | Hybrid Switched-Capacitor Converters for On-Chip Power Conversion | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |
| 2015-2017 | Series-Stacked Computer Architectures – Leveraging Multi-Core Systems for Extreme Miniaturization of Mobile Computing Platforms | Air Force Office of Scientific Research - YIP | \$360,000 (\$360,000) | 1, Robert Pilawa |
| 2015 | High Power Density Inverter Using Switched-Capacitor Structures, High Frequency Ripple Compensation, and GaN Transistors | Google | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |
| 2014-2015 | SONIC Center – Energy Processing for Nanoscale Information Processing | Semiconductor Research Corporation | \$200,000 (\$200,000) | 1, Robert Pilawa |
| 2014-2017 | High Speed, High Frequency Air-core Machine and Drive | NASA | \$2,000,000 (\$450,000) | 3, Kiruba Haran |
| 2014-2015 | High Efficiency Power Delivery for Data Centers | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |

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|-----------|--|---|---|------------------|
| 2014-2015 | Extreme Power Density Inverter Architectures | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |
| 2014-2015 | Hybrid Switched-Capacitor Converters for On-Chip Power Conversion | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |
| 2014-2016 | Power Conditioning: Resonant Switched-Capacitor Power Converters for Extreme Power Density and High Conversion Efficiency | Army Research Laboratory | \$240,000 (\$240,000) | 1, Robert Pilawa |
| 2014-2015 | Advanced Power Converter Architecture Employing Wide Bandgap Devices and Digital Control | Google.org | \$64,736 (\$64,736) Unrestricted gift | 1, Robert Pilawa |
| 2014-2016 | Illinois Center for a Smarter Electric Grid – Advanced Power Electronics for Solar Photovoltaics | State of Illinois DCEO | \$1,250,000 (\$250,000) | 5, Tom Overbye |
| 2014-2015 | Discretionary Research Funding | Power Affiliates Program | \$50,000 (\$6,250) | 8, Pete Sauer |
| 2013-2015 | Powering Big Data - A Systems Approach to Future Computing Platforms | UIUC College of Engineering – Strategic Research Initiative | \$179,000 (\$75,000) | 5, Robert Pilawa |
| 2013-2018 | The Mid-America Regional Microgrid Education and Training Consortium | Department of Energy | \$1,250,000 (\$125,000) | 5, Pete Sauer |
| 2013-2014 | Google Research Award: Data Center Power Delivery with Series-Stacked Voltage Domains – Improving Efficiency, Reliability, and Power Density | Google | \$56,200 (\$56,200) Unrestricted gift | 1, Robert Pilawa |
| 2013-2014 | Asymmetric Interleaving for Multi-Output Low-Voltage CMOS Power Delivery | Texas Instruments | \$30,000 (\$30,000) Unrestricted gift | 1, Robert Pilawa |
| 2013-2014 | High Efficiency Power Delivery for Data Centers | Texas Instruments | \$60,000 (\$60,000) Unrestricted gift | 1, Robert Pilawa |
| 2013-2014 | Discretionary Research Funding | Power Affiliates Program | \$50,000 (\$8,333) | 6, Pete Sauer |
| 2012-2015 | Solar-ADEPT: Scalable Submodule Power Conversion Methods for Power Density, Efficiency, Performance, and Protection Leaps in Utility-scale Photovoltaics | ARPA-E | \$1,062,494 (\$354,160) | 3, Phil Krein |
| 2012-2014 | Illinois Center for a Smarter Electric Grid | State of Illinois DCEO | \$1,250,000 (\$250,000) | 5, Tom Overbye |

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|-----------|--------------------------------|--------------------------|-------------------------------|---------------|
| 2012-2013 | Discretionary Research Funding | Power Affiliates Program | \$50,000 (\$8,333) | 6, Pete Sauer |
| Total | | | \$11,396,184 (\$4,829,155) | |