

Phillip Kollmeyer

Senior Principal Research Engineer
Electrical and Computer Engineering, McMaster University
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RESEARCH INTERESTS

- Thermal modeling and thermal management system design for energy storage systems
- Design optimization of transportation and renewable energy systems with energy storage
- Machine learning for energy storage systems, electrified transportation, and energy systems
- Methods for optimally controlling power split in energy and traction systems
- Modeling and applications of batteries, ultracapacitors, and Li-ion capacitors
- Aging modeling and experimental aging test design for energy storage devices
- Wide bandgap semiconductors and multi-speed gearboxes for improved electric traction systems
- Hybrid energy storage system design, simulation, and verification

ACADEMIC PREPARATION

Ph.D. in Electrical Engineering, minor in Mechanical Engineering Fall 2015
University of Wisconsin – Madison, WI, USA

- *Dissertation Title:* "Development and Implementation of a Battery-Electric Light-Duty Class 2a Truck including Hybrid Energy Storage"
- *Advisor:* Thomas Jahns • *Committee:* Bob Lorenz, Bulent Sarlioglu, Yehui Han, Thomas Nehl

M.S. in Electrical Engineering Spring 2011
University of Wisconsin – Madison, WI, USA

- *Thesis:* "Electromechanical Modeling and Analysis of a Corbin Sparrow Electric Vehicle using On the Road Data"
- *Advisor:* Thomas Jahns
- Energy Analysis and Policy Certificate from the Nelson Institute for Environmental Studies

B.S. in Electrical Engineering Spring 2006
University of Wisconsin – Madison, WI, USA

ACADEMIC APPOINTMENTS

McMaster University, Hamilton, Ontario, Canada July 2016 - Present
Senior Principal Research Engineer (July 2019-Present), McMaster Automotive Resource Center

- *P.I.:* Ali Emadi, Canada Excellence Research Chair in Hybrid Powertrain Program
- *Responsibilities:*
 - Overall engineering project lead for Stellantis (formerly Fiat Chrysler Automobiles) Car of the Future project: *45 total engineers, post-doctoral fellows, and students*
 - Lead of Eaton e2Mobility Electric Drivetrain Architecture project (through May 2020): *one engineer, two graduate students, two undergraduate students*
 - Manage high power dyno and battery test lab facilities

Postdoctoral Fellow (July 2016-July 2019), McMaster Automotive Resource Center

- *P.I.:* Ali Emadi, Canada Excellence Research Chair in Hybrid Powertrain Program
- *Responsibilities:*
 - Design and build energy storage laboratory
 - Lead Energy Management Systems area of FCA Car of the Future Project

University of Wisconsin-Madison 2007 - 2015
Wisconsin Electric Machines and Power Electronics Consortium, Graduate Research Assistant

AWARDS

- Best Paper Award, IEEE Transactions on Industrial Electronics, 2019
- 1st place paper award, IEEE-IAS IPCSD Transportation Systems Committee, 2015
- 2nd place paper award, IEEE-IAS IPCSD Transportation Systems Committee, 2015
- Grainger Graduate Power Engineering Award, 2014
- Gerald Holdridge Teaching Excellence Award, 2014
- Polygon Engineering Council Outstanding Teaching Assistant Award, 2011
- Bacon Fellowship for Electrical Engineering Graduate Students, 2007-2009
- Grainger Undergraduate Power Engineering Award, 2006

RESEARCH EXPERIENCE

At McMaster University

Battery Modeling Utilizing Neural Networks 2016 - present

- Advising Ph.D. students developing neural network battery state of charge estimation models

Battery Testing and Thermal Analysis for Ultrafast charging 2016 - present

- Advising masters students testing batteries for ultrafast charging and developing thermal models

Advanced Energy Management Systems Development for Electrified Vehicles 2016 - present

- LEAP and The Car of the Future project with Fiat Chrysler Automobiles
- Developing and testing advanced SOC, SOH, and SOP algorithms and thermal modeling techniques

Design of Next Generation Electric Drivetrain Architectures 2019 - present

- e2Mobility project with Eaton Corporation, continued with internal funding since May 2020
- Designing and evaluating highly efficient electric drivetrains with wide band gap devices, multi-speed gearboxes, and other efficiency enhancing characteristics

At University of Wisconsin-Madison

Hybrid Energy Storage System Design for Light Duty Vehicles funded by WEMPEC 2013-2015

- Demonstrated substantial improvement in battery power capability and efficiency as well as vehicle range at low temperatures, where lithium ion battery performance can be severely limited

Ford F150 Truck Specialized Electric Research Vehicle for On the Road Evaluation of a Prototype IPM Traction Motor, Drive, and Gearbox funded by Orchid International 2011-2012

- Proposed project to Orchid International, served as project lead with 20 project collaborators including students, engineers, & machinists
- Designed an electric truck to have similar range to 1st gen. Nissan Leaf (70 miles), and similar power (135kW) and wheel torque (4,900Nm) to original gas powered truck; includes advanced, custom built data logging system recording over 350 measured signals at 10Hz
- Drove electric truck more than 10,000 km to collect data for research projects

Battery Dynamic Tests funded by Johnson Controls 2014

- Investigated mild hybrid system resonance issue by performing specialized high frequency, high power testing on battery pack assembly

Development of Software and Hardware Tools for Ultracapacitor Testing, Balancing, Voltage Sensing, and Modeling funded by General Motors 2011

- Provided detailed comparative analysis of three ultracapacitor types tested

Electromechanical Modeling of Corbin Sparrow Electric Vehicle funded by WEMPEC 2008-2010

- Utilized data from hundreds of miles of driving to develop electromechanical model of vehicle and to evaluate effect of utilizing regenerative braking and improved battery and motor technologies

GRANTS and FUNDING

At McMaster University

The Car of the Future 2019-2024

- Role: Grant coauthor, Energy Management Systems track, 15% of grant
- P.I.: Ali Emadi
- Funding agency and industry partners: NSERC CRD & IRC, Fiat Chrysler Automobiles
- Total Amount: \$10.5 million CAD

(Under Review) Algorithms and Techniques for Battery Management Systems 2022-2023

- Role: Grant author
- P.I.: To be determined
- Funding source: NXP Semiconductors
- Total Amount: \$250k CAD

At University of Wisconsin-Madison

Battery Dynamic Tests 2014

- Role: Grant lead author and project manager
- P.I.: Thomas Jahns
- Industry Funding Source: Johnson Controls
- Total Amount: \$13k USD

Development of a Ford F150 Truck with Electrified Powertrain 2011-2012

- Role: Grant lead author and project manager
- P.I.: Thomas Jahns
- Industry Funding Source: Orchid International
- Total Amount: \$140k USD (cash) + \$140k USD (in kind)

Development of Software and Hardware Tools for Ultracapacitor Testing, Balancing, Voltage Sensing, and Modeling 2011

- Role: Grant lead author and project manager
- P.I.: Thomas Jahns
- Industry Funding Source: General Motors
- Total Amount: \$27k USD

LABORATORY DESIGN AND DEVELOPMENT PROJECTS (lead or co-lead)

At McMaster University

MARC/CMHT Battery Lab Phase I, \$90k CAD to add equipment and commission lab 2016-2018

- Pack cyclers, multi-channel commercial cell cycler, and custom high-performance cycler
- Three thermal chambers and automated gas sensing and fire suppression safety system
- High voltage tools, safety, and assembly equipment
- Developed comprehensive standardized training, documentation, and procedures for lab users

MARC/CMHT Battery Lab Phase II, \$65k CAD to add to existing equipment 2019-2020

- High accuracy and high input impedance eight channel cycler, liquid cooling system, thermal chamber, and high-performance thermal camera
- Advanced battery test fixtures and improved battery and equipment storage facilities

MARC/CMHT High Power Dyno Labs Standardization and Automation, \$125k CAD 2019-2021

- Eight channel high performance power analyzer, 300kW inverter for characterization of electric machines, upgraded mechanical, electrical, and cooling systems
- Standardized mechanical and electrical hardware between multiple laboratories to double testing capabilities
- Developing training and automated procedures for testing high power electric machines and inverters to increase lab throughput and quality of testing

At University of Wisconsin-Madison

Johnson Controls Advanced Systems Test Lab, \$500k USD for equipment 2013-2014

- Co-led group which specified and got quotes for all equipment for the battery test lab
- Worked with equipment vendors, UW safety, and electrical and fire suppression contractors to complete installation and commissioning of equipment.

Wisconsin Energy Institute Microgrid Lab Seed Grant, \$167k USD for equipment/supplies 2013

- Co-led committee which purchased equipment to outfit brand new lab for microgrid, energy storage, and electrified vehicle research and to build new 400kW microgrid.

Automated High-Performance Battery Test Stand, \$25k USD for equipment 2008

- Wrote capital equipment proposal and received funding from College of Engineering.
- Designed, built, and developed software for high performance battery test stand with automated impedance spectroscopy, which was used for many research projects and was the baseline for test stands built at General Motors and McMaster University.

TEACHING and ADVISING

At McMaster University

Advisory Roles 2016-Present

- Eocar plug-in hybrid vehicle team – High voltage safety supervisor
- Formula electric vehicle team – Electrical safety advisor
- Battery Lab Manager
- Energy Storage Systems Safety Trainer
- COVID-19 Policy and Training Lead for CERC@MARC Labs

Ph.D. Student Co-Advising 2016-Present

1. Ephrem Chemali, *Intelligent State-of-Charge and State-of-Health Estimation Framework for Li-ion Batteries in Electrified Vehicles using Deep Learning Techniques*, graduated 2018
2. Carlos Vidal, *Deep Neural Networks for Improved Equivalent Circuit Modelling and State-of-Charge Estimation of Lithium-ion Batteries for Traction Applications*, graduated 2020
3. Pier Giuseppe Anselma, *Multi-Objective Optimization of Hybrid Electric Vehicle Drivetrains for Control of Battery Pack Aging*, graduated 2021
4. Mina Naguib, *Machine Learning for Battery Pack State Estimation with a Reduced Number of Sensors*, expected graduation 2022
5. Fabricio Machado, *High Efficiency Traction System Design via Multi-Gear, Multi-Motor Systems*, expected graduation 2022
6. Alex Allca-Pekarovic, *High Efficiency Traction System Design via Wide Band Gap Power Electronics*, expected graduation 2023

Master's Student Co-Advising 2016-Present

1. Mackenzie Wootton, *Experimental Analysis of Electric Double Layer and Lithium-Ion Capacitors and their Application in a Simulated DC Metro Railway System*, graduated 2018
2. Melissa He, *Testing, Characterization, and Thermal Analysis of Lithium-Ion Batteries Toward Battery Pack Design for Ultra-Fast Charging*, graduated 2018

3. Abdel Rahman Tawakol, *Performance Characterization and Modelling of a Lithium-Ion Cell using Electrochemical Impedance Spectroscopy*, graduated 2020
4. Jeremy Lempert, *Design Methodology and Modeling of a Fast Charging Battery Module and Thermal Management System for Electric Vehicles*, graduated 2020
5. Ziyu Zhao, *Ultrafast Charging Battery Pack Design with Intercell Cooling*, graduated 2021
6. Josimar Duque, *Improved Battery Aging Testing and Modeling Techniques for Traction and Fast Charging Applications*, expected graduation 2021
7. Fauzia Khanum, *Accurate Electric Vehicle Range Estimation Using Neural Networks*, expected graduation 2021
8. Junran Chen, *Real Time Implementation of Machine Learning Algorithms for Battery Packs*, expected graduation 2023

Undergraduate Research Assistant Mentoring 2018-Present

1. Michael Skells – Energy Storage Modeling and Testing
2. Jason Tong – Mechanical Fixture Design for Energy Storage Lab
3. Shadi Zargari – High Power Traction Dyno Operation and Test Plan Design
4. Simon Opalka – Mechanical Mounting Design for Electric Traction Machine Testing
5. Salman Khalid – Electrical System Design and Fabrication for Electric Traction Machine Testing
6. Vincent Magcalas – Mechanical System Design & Fabrication for Electric Traction Machine Testing
7. Jessie Boudreaux – CSA Certification of Custom Battery Cycler and Battery Pack Redesign
8. Mairi Middleton – High Power Traction Dyno Setup and Documentation
9. Justin Isenberg – Mechanical Fixtures for High Power Traction Machines
10. Thomas Lawford – Battery Test Fixture Design and Battery Open Source Data Sharing

At University of Wisconsin-Madison

Engineering Professional Development Course Instructor 2013-Present

- Introduction to electric machines and drives short course (three days)
- Developed new lab which is taught for yearly offering of course: three hour hands on lab examining induction, wound field synchronous, and permanent magnet synchronous machines (30 to 50 participants each year from industry)

Teaching Assistant 2008-2015

- ECE 377: Fundamentals of Electrical and Electro-Mechanical Power Conversion, 6 semesters (Discussion TA for 100 undergraduate students)
- ECE 304: Electric Machines Laboratory, 3 semesters (Lab TA for 30 undergraduate students)

Undergraduate and Graduate Independent Study Advising Projects 2011-2015

Advised five undergraduate students and one graduate student on the following projects:

- Electric Truck CAD Design and Inertia Modeling of Rotating Components
- Development of a Thermal Model of a LiFePO₄ Battery Pack Using ES and Solidworks
- Experimental Verification of an Improved Battery Pack Thermal Model during Fast Charging
- Modeling, Design, and Fabrication of a 200A, 350V Rated Half Bridge DC/DC Converter for Battery / Ultracapacitor Hybrid Energy Storage
- Retrofitting and Testing of a Corbin Sparrow Electric Vehicle with a Li-ion Battery Pack
- Control System Design for a Half Bridge DC/DC Converter for Battery / Ultracapacitor Hybrid Energy Storage

INDUSTRY EMPLOYMENT

Independent Consulting

January 2016 - Present

Performing consulting projects as Phillip Kollmeyer Consulting

- **Client:** *Eco Electric Mobility Co:* Drivetrain and control design for unique platform scooter with steering achieved via independent wheel motors
- **Client:** *Novele, Inc:* Development of scalable, wall mount grid tied battery packs for commercial applications
- **Client:** *Fiat Chrysler Automobiles* through *UW-Madison:* Lifecycle testing of 12V start-stop automotive batteries with a range of chemistries

General Motors, Warren, MI

Summer 2010 & 2011

R&D Electrical and Controls Integration Group Intern

Primary Project: Developed high-bandwidth, high-accuracy battery and ultracapacitor test stand

GE Healthcare-Life Support Systems, Madison, WI

2005 – 2008

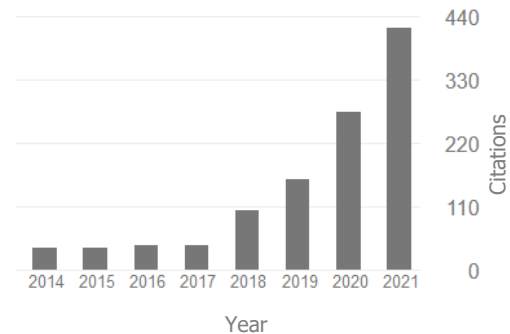
Advanced Technology Group Intern, Full & Part Time

Primary Project: Developed an electrically powered air pumping system for medical anesthesia machines

PUBLICATIONS, DATASETS, PATENTS, and MEDIA

Citations – Google Scholar Link: <https://scholar.google.com/citations?user=lv--0icAAAJ&hl=en>

	All	Since 2016
Citations	1199	1058
h-index	19	17
i10-index	29	27



Journal Publications:

- J1. (under review) C. Vidal, P. Malysz, M. Naguib, A. Emadi, P.J. Kollmeyer, "Estimating battery state of charge using recurrent and non-recurrent neural networks," *Journal of Energy Storage*, submitted June 2021.
- J2. (under review) F. Machado, P.J. Kollmeyer, D. Barroso, A. Emadi, "Multi-speed Gearboxes for Battery Electric Vehicles: Current Status and Future Trends," *IEEE Open Journal of Vehicular Technology*, submitted April 2021.
- J3. S. Feraco, P.G. Anselma, A. Bonfitto, P.J. Kollmeyer, "Robust data-driven battery state of charge estimation for hybrid electric vehicles," *SAE International Journal of Electrified Vehicles*, accepted June 2021.
- J4. M. Naguib, P. Kollmeyer and A. Emadi, "Lithium-Ion Battery Pack Robust State of Charge Estimation, Cell Inconsistency, and Balancing: Review," *IEEE Access*, vol. 9, pp. 50570-50582, 2021.
- J5. P. Anselma, P.J. Kollmeyer, J. Lempert, Z. Zhao, G. Belingardi, A. Emadi, "Battery State-of-Health Sensitive Energy Management of Hybrid Electric Vehicles: Lifetime Prediction and Ageing Experimental Validation", *Applied Energy*, Volume 285, 2021.
- J6. I. Aghabali, J. Bauman, P. Kollmeyer, Y. Wang, B. Bilgin and A. Emadi, "800V Electric Vehicle Powertrains: Review and Analysis of Benefits, Challenges, and Future Trends," *IEEE Transactions on Transportation Electrification*, doi: 10.1109/TTE.2020.3044938.
- J7. J. Lempert, P.J. Kollmeyer, P. Malysz, O. Gross, J. Cotton, A. Emadi, "Battery Entropic Heating Coefficient Testing and Use in Cell-level Loss Modeling for Extreme Fast Charging", *SAE International Journal of Advances and Current Practices in Mobility*, 2(5):2712-2720, 2020.

- J8. C. Vidal, P.J. Kollmeyer, M. Naguib, P. Malysz, O. Gross, A. Emadi, "Robust xEV Battery State-of-Charge Estimator Design using Deep Neural Networks", *SAE International Journal of Advances and Current Practices in Mobility*, 2(5):2872-2880, 2020.
- J9. C. Vidal, P. Malysz, P.J. Kollmeyer and A. Emadi, "Machine Learning Applied to Electrified Vehicle Battery State of Charge and State of Health Estimation: State-of-the-Art," *IEEE Access*, vol. 8, pp. 52796-52814, 2020.
- J10. P.J. Kollmeyer, A. Lee, T.M. Jahns, "Aging and Performance Comparison of AGM, EFB, PbC, NiZn, and LiFePO4 12V Start Stop Vehicle Batteries," *Journal of Power Sources*, vol. 441, 2019.
- J11. P.J. Kollmeyer, Emadi, A., *et al.*, "Real-Time Control of a Full-Scale Li-ion Battery and Li-ion Capacitor Hybrid Energy Storage System for a Plug-in Hybrid Vehicle," *IEEE Transactions on Industry Applications*, vol. 55, no. 4, pp. 4204-4214, 2019.
- J12. C. Vidal, O. Gross, R. Gu, P.J. Kollmeyer and A. Emadi, "xEV Li-Ion Battery Low-Temperature Effects—Review," *IEEE Transactions on Vehicular Technology*, vol. 68, no. 5, pp. 4560-4572, 2019.
- J13. E. Chemali, P.J. Kollmeyer, M. Preindl, A. Emadi, "State-of-charge estimation of Li-ion batteries using deep neural networks: A machine learning approach," *Journal of Power Sources*, vol. 400, pp. 242-255, 2018.
- J14. E. Chemali, P. J. Kollmeyer, M. Preindl, R. Ahmed and A. Emadi, "Long Short-Term Memory Networks for Accurate State-of-Charge Estimation of Li-ion Batteries," *IEEE Transactions on Industrial Electronics*, vol. 65, no. 8, pp. 6730-6739, 2018. **Recipient of Best Paper Award from Industrial Electronics Society**
- J15. R. Zhao, P. J. Kollmeyer, R. D. Lorenz and T. M. Jahns, "A Compact Methodology Via a Recurrent Neural Network for Accurate Equivalent Circuit Type Modeling of Lithium-Ion Batteries," *IEEE Transactions on Industry Applications*, vol. 55, no. 2, pp. 1922-1931, 2019.
- J16. L.W. Juang, P.J. Kollmeyer, A.E. Anders, T.M. Jahns, R.D. Lorenz, D. Gao, "Investigation of the influence of superimposed AC current on lithium-ion battery aging using statistical design of experiments", *Journal of Energy Storage*, vol. 11, pp. 93-103, 2017.
- J17. L. W. Juang, P.J. Kollmeyer, T. M. Jahns and R. D. Lorenz, "Improved Nonlinear Model for Electrode Voltage–Current Relationship for More Consistent Online Battery System Identification," *IEEE Transactions on Industry Applications*, vol. 49, no. 3, pp. 1480-1488, 2013.

Journal Publications (in preparation):

- JP1. J. Lempert, P. J. Kollmeyer, M. He, M. Haußmann, J. Cotton, and A. Emadi, "Cell Selection and Thermal Management System Design for a 5C-Rate Ultrafast Charging Battery Module".
- JP2. E. Chemali, P. J. Kollmeyer, M. Preindl, and A. Emadi, "A Deep Learning Approach for State-of-Health Estimation of Li-ion Batteries".

Conference Publications:

- P1. (under review) M. Naguib, P. Kollmeyer, O. Gross, A. Emadi, "Microprocessor Execution Time and Memory Use of Battery State of Charge Estimation Algorithms", *SAE World Congress*, Detroit, MI, 2022.
- P2. (under review) F. Machado, P. Kollmeyer, A. Emadi "Chevrolet Bolt Electric Vehicle Model Validated with On-The-Road Data and Applied to Estimating the Benefits of a Multi-Speed Gearbox", *SAE World Congress*, Detroit, MI, 2022.
- P3. (under review) Z. Zhao, S. Panchal, P. Kollmeyer, O. Gross, D. Dronzkowski, Ali Emadi, "3D FEA Thermal Modeling with Experimentally Measured Loss gradient Function of Large Format Ultra-Fast Charging Battery Module used for EVs", *SAE World Congress*, Detroit, MI, 2022.
- P4. M. Naguib, P.J. Kollmeyer, C. Vidal, A. Emadi, "Accurate Surface Temperature Estimation of Lithium-Ion Batteries Using Feedforward and Recurrent Artificial Neural Network Models," *IEEE Transportation Electrification Conference and Expo (ITEC)*, Virtual Conference, 2021.
- P5. F. Khanoum, E. Louback, F. Duperly, C. Jenkins, P. Kollmeyer, A. Emadi, "A Kalman Filter Based Battery State of Charge Estimation MATLAB Function", *IEEE Transportation Electrification Conference and Expo (ITEC)*, Virtual Conference, 2021.
- P6. Z. Zhao, P.J. Kollmeyer, A. Emadi, "Experimental Comparison of Two Liquid Cooling Methods for Ultrafast Charging Lithium-Ion Battery Modules," *IEEE Transportation Electrification Conference and Expo (ITEC)*, Virtual Conference, 2021.
- P7. P.G. Anselma, P.J. Kollmeyer, S. Feraco, A. Bonfitto, G. Belingardi, A. Emadi, N. Amati, A. Tonoli, "Assessing Impact of Heavily Aged Batteries on Hybrid Electric Vehicle Fuel Economy and Drivability," *IEEE Transportation Electrification Conference and Expo (ITEC)*, Virtual Conference, 2021.
- P8. M. Naguib, C. Vidal, P.J. Kollmeyer, P. Malysz, O. Gross, A. Emadi, "Comparative Study between Equivalent Circuit and Recurrent Neural Network Battery Voltage Models," *SAE World Congress*, Detroit, MI, 2021.

- P9. A. Allca-Pekarovic, P.J. Kollmeyer, P. Mahvelatishamsabadi, T. Mirfakhrai, P. Naghshtabrizi, A. Emadi, "Comparison of IGBT and SiC Inverter Loss for 400V and 800V DC Bus Electric Vehicle Drivetrains", *2020 IEEE Energy Conversion Congress & Expo (ECCE)*, Detroit, MI, 2020.
- P10. P.G. Anselma, P.J. Kollmeyer, G. Belingardi, A. Emadi, "Multitarget Evaluation of Hybrid Electric Vehicle Powertrain Architectures Considering Fuel Economy and Battery Lifetime", *CO2 Reduction for Transportation Systems Conference*, Virtual Conference, 2020.
- P11. P.G. Anselma, P.J. Kollmeyer, G. Belingardi, A. Emadi, "Multi-Objective Hybrid Electric Vehicle Control for Maximizing Fuel Economy and Battery Lifetime", *IEEE Transportation Electrification Conference and Expo (ITEC)*, Virtual Conference, 2020.
- P12. J. Lempert, P.J. Kollmeyer, P. Malysz, O. Gross, J. Cotton, A. Emadi, "Battery Entropic Heating Coefficient Testing and Use in Cell-level Loss Modeling for Extreme Fast Charging", *SAE World Congress*, Detroit, MI, 2020.
- P13. C. Vidal, P.J. Kollmeyer, M. Naguib, P. Malysz, O. Gross, A. Emadi, "Robust xEV Battery State-of-Charge Estimator Design using Deep Neural Networks", *SAE World Congress*, Detroit, MI, 2020.
- P14. C. Vidal, P. J. Kollmeyer, E. Chemali, and A. Emadi, "Li-ion Battery State of Charge Estimation using Long Short-Term Memory Recurrent Neural Network with Transfer Learning," *2019 IEEE Transportation Electrification Conference and Expo (ITEC)*, Novi, MI, 2019.
- P15. T. Nemeth, P. J. Kollmeyer, A. Emadi, and D.U. Sauer, "Optimized Operation of Hybrid Energy Storage Systems for High-Power Electric Vehicles," *2019 IEEE Transportation Electrification Conference and Expo (ITEC)*, Novi, MI, 2019.
- P16. M. S. He, P. J. Kollmeyer, M. Haußmann and A. Emadi, "A Comparison of the Performance and Thermal Management Requirements of Lithium-Ion Batteries During Ultra-Fast Charging," *2018 IEEE Transportation Electrification Conference and Expo (ITEC)*, Long Beach, CA, 2018, pp. 675-680.
- P17. A. Biswas, R. Gu, P.J. Kollmeyer, R. Ahmed and A. Emadi, "Simultaneous State and Parameter Estimation of Li-Ion Battery With One State Hysteresis Model Using Augmented Unscented Kalman Filter," *2018 IEEE Transportation Electrification Conference and Expo (ITEC)*, Long Beach, CA, 2018, pp. 1065-1070.
- P18. Kollmeyer, P.J.; Emadi, A.; *et al.*, "Optimal performance of a full scale li-ion battery and li-ion capacitor hybrid energy storage system for a plug-in hybrid vehicle," *2017 IEEE Energy Conversion Congress and Exposition (ECCE)*, Cincinnati, OH, USA, 2017, pp. 572-577.
- P19. Kollmeyer, P.J.; Hackl, A.; Emadi, A. "Li-ion battery model performance for automotive drive cycles with current pulse and EIS parameterization," *2017 IEEE Transportation Electrification Conference and Expo (ITEC)*, Chicago, IL, 2017, pp. 486-492.
- P20. Zhao, R.; Kollmeyer, P.J.; Lorenz, R.D.; Jahns, T.M. "A compact unified methodology via a recurrent neural network for accurate modeling of lithium-ion battery voltage and state-of-charge," *2017 IEEE Energy Conversion Congress and Exposition (ECCE)*, Cincinnati, OH, USA, 2017, pp. 5234-5241.
- P21. Kollmeyer, P.J.; Sridhar, A.; Jahns, T.M. (2016) "Modeling of Low-Temperature Operation of a Hybrid Energy Storage System with a Butler-Volmer Equation Based Battery Model," *Proc. Of IEEE Energy Conversion Congress and Expo (ECCE)*, Milwaukee, WI
- P22. Sridhar, A.; Kollmeyer, P.J.; Jahns, T.M. (2016) "Model-based Control Design for a Battery/Ultracapacitor DC-DC Converter System," *Proc. Of IEEE Energy Conversion Congress and Expo (ECCE)*, Milwaukee, WI
- P23. Prasad, R.; Namuduri, C.S.; Kollmeyer, P.J. (2015) "Onboard Unidirectional Automotive G2V Battery Charger using Sinusoidal Charging and its Effect on Li-ion Batteries" *Proc. of IEEE Energy Conversion Congress & Expo (ECCE)*, Montreal, Canada, September, 20-24 **Recipient of 1st place paper award: IEEE-IAS IPCSD Transportation Systems Committee**
- P24. Juang, L.W.; Kollmeyer, P.J.; Zhao, R.; Jahns, T.M.; Lorenz, R.D.; "Coulomb Counting State-of-Charge Algorithm for Electric Vehicles with a Physics-Based Temperature Dependent Battery Model" (2015) *Proc. of IEEE Energy Conversion Congress & Expo (ECCE)*, Montreal, Canada, September, 20-24, **Recipient of 2nd place paper award: IEEE-IAS IPCSD Transportation Systems Committee**
- P25. Kollmeyer, P.J.; McFarland, J.D.; Jahns, T.M.; "Comparison of Class 2a Truck Electric Vehicle Drivetrain Losses for Single- and Two-Speed Gearbox Systems with IPM Traction Machines" *International Electric Machines and Drives Conference (IEMDC)*, Coeur d'Alène, ID, 10-13 May 2015
- P26. Juang, L.W.; Kollmeyer, P.J.; Zhao, R.; Jahns, T.M.; Lorenz, R.D.; "The Impact of DC Bias Current on the Modeling of Lithium Iron Phosphate and Lead-Acid Batteries Observed using Electrochemical Impedance Spectroscopy," *Proc. of IEEE Energy Conversion Congress & Expo (ECCE)*, Pittsburgh, PA, September, 14-18, 2014

- P27. Kollmeyer, P.J.; Juang, L.W.; Jahns, T.M., "Loss optimization and ultracapacitor pack sizing for vehicles with battery/ultracapacitor hybrid energy storage," Transportation Electrification Conference and Expo (ITEC), 2014 IEEE , pp.1,8, 15-18 June 2014
- P28. Juang, L.W.; Kollmeyer, P.J.; Jahns, T.M.; Lorenz, R.D., "Improved modeling of lithium-based batteries using temperature-dependent resistance and overpotential," Transportation Electrification Conference and Expo (ITEC), 2014 IEEE , pp.1-8, 15-18 June 2014
- P29. Hart, P.J.; Kollmeyer, P.J.; Juang, L.W.; Lasseter, R.H.; Jahns, T.M., "Modeling of second-life batteries for use in a CERTS microgrid," Power and Energy Conference at Illinois (PECI), 2014, pp.1,8, Feb. 28 2014-March 1 2014
- P30. Mendoza-Araya, P.A; Kollmeyer, P.J.; Ludois, D.C., "V2G integration and experimental demonstration on a lab-scale microgrid," Energy Conversion Congress and Exposition (ECCE), 2013 IEEE , pp.5165-5172, 15-19 Sept. 2013
- P31. Juang, L.W.; Kollmeyer, P.J.; Jahns, T.M.; Lorenz, R.D., "Implementation of online battery state-of-power and state-of-function estimation in electric vehicle applications," Energy Conversion Congress and Exposition (ECCE), 2012 IEEE , pp.1819-1826, 15-20 Sept. 2012
- P32. Kollmeyer, P.J.; Lamb, W.; Juang, L.W.; McFarland, J.D.; Jahns, T.M.; Sarlioglu, B., "Design of an electric powertrain for a Ford F150 crew cab truck utilizing a lithium battery pack and an interior PM synchronous machine drive," Transportation Electrification Conference and Expo (ITEC), 2012 IEEE , pp.1-8, 18-20 June 2012
- P33. Juang, L.W.; Kollmeyer, P.J.; Jahns, T.M.; Lorenz, R.D., "Improved nonlinear model for electrode voltage-current relationship for more consistent online battery system identification," Energy Conversion Congress and Exposition (ECCE), 2011 IEEE , pp.2628-2634, 17-22 Sept. 2011
- P34. Kollmeyer, P.J.; Juang, L.W.; Jahns, T.M., "Evaluation of an electromechanical model for a Corbin Sparrow electric vehicle," Vehicle Power and Propulsion Conference (VPPC), 2011 IEEE , pp.1,6, 6-9 Sept. 2011
- P35. Kollmeyer, P.J.; Juang, L.W.; Jahns, T.M., "Development of an electromechanical model for a Corbin Sparrow electric vehicle," Vehicle Power and Propulsion Conference (VPPC), 2011 IEEE , pp.1-8, 6-9 Sept. 2011
- P36. Juang, L.W.; Kollmeyer, P.J.; Jahns, T.M.; Lorenz, R.D., "System identification-based lead-acid battery online monitoring system for electric vehicles," Energy Conversion Congress and Exposition (ECCE), 2010 IEEE , pp.3903-3910, 12-16 Sept. 2010
- P37. Kollmeyer, P.J.; Juang, L.W.; Jahns, T.M.; Lorenz, R.D., "Development of a Vehicle-to-Grid Demonstrator System for a Plug-In Hybrid Electric Vehicle", Center for Power Electronics Systems (CPES) Conference, 2008

Open Source Battery Datasets and Estimation Code:

- D1. Kollmeyer, P.J., "Panasonic 18650PF Li-ion Battery Data", Mendeley Data, v1, 2018. <http://dx.doi.org/10.17632/wykht8y7tg.1>
- D2. Kollmeyer, P.J.; Naguib, M.; Skells, M., "LG 18650HG2 Li-ion Battery Data", Mendeley Data, v2, 2020. <http://dx.doi.org/10.17632/b5mj79w5w9.2>
- D3. Kollmeyer, P.J.; Vidal, C.; Naguib, M.; Skells, M., "LG 18650HG2 Li-ion Battery Data and Example Deep Neural Network xEV SOC Estimator Script", Mendeley Data, v3, 2020. <http://dx.doi.org/10.17632/cp3473x7xv.3>
- D4. Kollmeyer, P.J.; Skells, M., "Turnigy Graphene 5000mAh 65C Li-ion Battery Data", Mendeley Data, v1, 2020. <http://dx.doi.org/10.17632/4fx8cjprxm.1>

Patents:

1. Primary inventor for: US Pat. US20080029096 A1 - *Pressure Targeted Ventilator Using an Oscillating Pump, 2008*
2. Primary inventor for US Pat. US20080196720 A1 - *Mobile Medical Ventilator, 2008*

Invited Presentations (excluding ones associated with the conference papers listed above):

1. "Applying Artificial Intelligence to Battery State Estimation", tutorial, *IEEE Energy Conversion Congress and Exposition, 2021*
2. "Battery State Estimation Using Deep Learning" *Mathworks Webinar, 2020*
3. "Cell Selection and Thermal Management System Design for a 5C Rate Ultrafast Charging Battery Module", *Oxford-Brookes University, United Kingdom, 2019*
4. "Cell Selection and Thermal Management System Design for a 5C Rate Ultrafast Charging Battery Module", *Advanced Battery Power Conference, Aachen, Germany, 2019*
5. "Aging Comparison of 12V Start Stop Batteries of Varying Chemistry and Type", *Advanced Battery Power Conference, Munster, Germany, 2018*

6. "Electric Vehicle Research at UW Madison" *Madison's PLATO (Participatory Learning and Teaching Organization) alumni and senior lifelong learning organization*, 2015
7. "Electric F-150 Truck and Hybrid Energy Storage Investigation," *WEMPEC Annual Review Meeting*, 2014
8. "UW's EV Work & the Transition to Electrified Transportation" *Madison's PLATO (Participatory Learning and Teaching Organization) alumni and senior lifelong learning organization*, 2014
9. "Electric Vehicles are Finally Here! Their Role in a Carbon Fuel Constrained World," *Wisconsin Alumni Association – Green County Chapter*, 2011
10. "Development and Evaluation of an Electromechanical Model for Electric Vehicles with Alternative Battery Technologies Sparrow," *WEMPEC Annual Review Meeting*, 2011

Featured News Articles, Video, and Radio:

1. "[Complementary Collaboration: Partnering for the Future of Energy Storage Systems](#)" June 2, 2014
2. "[Electric Car Is Undergoing Resurrection, Says UW Researcher](#)," *The Larry Meiller Show*, Wisconsin Public Radio, [Radio Broadcast Link](#), May 27, 2014
3. "[Driving the electric truck, Orchid Monroe, and UW-Madison's win-win](#)," April 21, 2014
4. "[Electric Vehicle Research at the Wisconsin Energy Institute](#)," video, April 17, 2014
5. "Photos from EVS26 Electric Vehicle Show," Motor Trend's Truck Trend blog post, May 7, 2012
6. "[Monroe manufacturer partners with UW-Madison on electric truck](#)," January 11, 2011

SERVICE

SERVICE TO PROFESSION:

- IEEE Transportation Electrification Conference (ITEC), General Chair (2023), Program Chair (2022), Co-Program Chair (2021), Assistant Program Chair and Treasurer (2020), Publication Chair (2019)
- Proposal Reviewer for Nebraska Center for Energy Sciences Research, 2021
- Journal of Energy Storage Reviewer, 2018-2021
- IEEE Transactions on Transportation Electrification Journal Reviewer, 2016-2021
- IEEE Access Journal Reviewer, 2020
- IEEE Transactions on Energy Conversion Reviewer, 2016
- IEEE ECCE Conference Paper Reviewer, 2013-2014, 2016, 2020

PROFESSIONAL MEMBERSHIPS:

- IEEE Member, 2006 to present

NON-PROFIT INVOLVEMENT AND OUTREACH:

- Tours and Presentations for Madison East HS Engineering Club; Camp Badger, PEOPLE, and PROCSEI programs for middle and high school students interested in engineering; PLATO lifelong learning for seniors; 2011-2015
- Habitat for Humanity – Led 10 group trips to build 23 houses in Palatka Florida, 2002-2011
- The Crossing non-profit – Executive director hiring committee, 2014; \$2 million USD building renovation project committee member, 2010-2011, project received award from Madison Trust for Historic Preservation, Board of Directors Member 2021