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Education and Training

- Ph.D. in Electrical Engineering with focus on Power Systems Engineering, University of Tennessee, Knoxville, '09
- M.S. in Electrical Engineering with focus on Power Electronics , University of Tennessee, Knoxville, '06
- B.S. in Electrical Engineering, University of Tennessee, Knoxville, '04

Research and Professional Experience

- 2009 – 2019** *Electrical Engineering Researcher, Power and Energy Systems, Oak Ridge National Laboratory, Oak Ridge, TN*
- 2016 - 2019** Lead on team to develop agent-based system to integrate transactive controls to HVAC and water heaters into a smart community.
Developed an energy storage system prototype composed of secondary use batteries for Habitat for Humanity
Developed transactive agent-based inverter system.
- 2015 – 2016** Lead on a team that developed open-source microgrid controller called CSEISMIC. Controller supports resource optimization, automatic communication and device integration through DDS, and islanding and resynchronization features.
- 2015** Lead on prototype construction of a secondary-use energy storage system with new inverter controls and communication interface.
- 2013 – 2015** Lead on secondary-use energy storage research and development of testing platform at ORNL for testing ABB/GM energy storage system.
- 2012 – 2013** Lead on industrial demand response project to evaluate the demand response potential of industrial loads across the U.S. Created a new tool that was patented (IGATE).
- 2009 – 2012** Supported development of publications and standards for the IEEE Wind and Solar Collector Design Working Group
- 2004– 2009** *Graduate Researcher at University of Tennessee – performed dissertation and other projects*
Dissertation - “DC Distribution with Fuel Cells as Distributed Energy Resources”
- 2003– 2004** *Future Truck Competition – supported competitive build of a hybrid electric vehicle conversion of a ford explorer.*

Patents

Nasr E. Alkadi, Michael R. Starke, “Industrial geospatial analysis tool for energy evaluation,” Patent No. 9378256, UT-Battelle, LLC, June 28, 2016.

Publications

Publications which are mostly focused on renewables, energy storage, demand response, and DC systems: The following is a list of recent, most closely related publications to the proposed project:

Journals and conferences

- **M. Starke**, J. Munk, H. Zandi, T. Kuruganti, H. Buckberry, J. Hall, J. Leverette, “Agent-Based System for Transactive Control of Smart Residential Neighborhoods,” IEEE Power and Energy General Meeting, 2019 (accepted).
- **M. Starke**, R. Zeng, S. Zheng, M. Smith, M. Chinthavali, Z. Wang, B. Dean, L.M. Tolbert, “A Multi-Agent System Concept for Rapid Energy Storage Development,” IEEE Innovative Smart Grid Technologies, 2019.
- H. Zandi, **M. Starke**, T. Kuruganti, “A General Framework to Transform any Home Energy Management System to a Multi-agent System” 7th International Building Physics Conference, September 2018.
- J. Araiza, J. Hambrick, J. Moon, **M. Starke** and C. Vartanian, "Grid Energy-Storage Projects: Engineers Building and Using Knowledge in Emerging Projects," in IEEE Electrification Magazine, vol. 6, no. 3, pp. 14-19, Sept. 2018.
- O. Ceylan, A. Dimitrovski, **M. Starke**, K. Tomsovic, “A Novel Approach for Voltage Control in Electric Power Distribution Systems,” IEEE Knowledge in Emerging Projects” IEEE Electrification Magazine, September 2018. Power and Energy Society General Meeting August 2018.
- Y. Xue, **M. Starke**, J. Dong, M. Olama, T. Kuruganti, J. Taft, and M. Shankar, “On a Future for Smart Inverters with Integrated System Functions,” IEEE Power and Energy Society General Meeting August 2018.
- M. Smith, **M. Starke**, A. Herron, D. King, L. Tolbert, Autonomous Battery Identification and Health Parameterization, Power Industry Division Symposium, June 2018.
- Xue, Yaosuo; Li, Fangxing; **Starke, Michael**; An Islanding Detection Methodology Combining Decision Trees and Sandia Frequency Shift for Inverter Based Distributed Generations, IET Power Electronics, 2017.
- **Starke, Michael**; King, Dan; Herron, Drew, “Implementation of a DDS protocol in Microgrid Islanding and Resynchronization with Self-Discovery”, IEEE Transactions on Smart Grid, September 2017.
- B.R. Cui, J. Munk, R. Jackson, D. Fugate, **M. Starke**. 2017. Building thermal model development of typical house in U.S. for virtual storage control of aggregated building loads based on limited available information. The proceeding of ECOS 2017- The 30th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems, July 2 -6, 2017. San Diego, California, USA
- Liu, Guodong; Xiao, Bailu; **Starke, Michael**; Zhang, Xiaohu; Tomosovic, Kevin; A New Distributed Optimization for Community Microgrid Scheduling, The Hawaii International Conference on System Sciences, 2017.

- **Starke, Michael**; Smith, Mitchell; Sawyer, Nevin; Liu, Guodong; Dean, Benjamin; Schultz, Bryan; Spiers, Dirk; Harmon, Harvey; Development and Analysis of Energy Storage Sizing Tool for Residential Deployment, IEEE Power and Energy Society General Meeting, 2017.
- Liu, Guodong; Li, Zhi; **Starke, Michael**; Ollis, Ben; Tomosovic, Kevin; Optimal Sizing of Energy Storage for Community Microgrids Considering Building Thermal Dynamics, IEEE Power and Energy Society General Meeting, 2017.
- Liu, Guodong; **Starke, Michael**; Xiao, Bailu; Tomosovic, Kevin; Robust Optimization Based Microgrid Scheduling With Islanding Constraints, IET Generation, Transmission, & Distribution, 2017.
- Liu, Guodong; **Starke, Michael**; Xiao, Bailu; Zhang, X; Tomosovic, Kevin; Microgrid optimal scheduling with chance-constrained islanding capability, Electric Power Systems Research, Volume 145, April 2017, Pages 197-206, April 2017
- G. Gurralla, A. Dimitrovski, S. Pannala, S. Simunovic, **M. Starke**, “Large Multi-Machine Power System Simulations Using Multi-Stage Adomian Decomposition”, submitted to IEEE/PES Transactions on Power Systems, paper TPWRS-00351-2016.
- Jackson R, Curran S, Chambon P, Post B, Love, L, Wagner R, Ozpineci B, Chinthavali M, **Starke M**, Green J, Tryggestad L, Lee B. Overview of the Oak Ridge National Laboratory Advanced Manufacturing Integrated Energy Demonstration Project: Case Study of Additive Manufacturing as a Tool to Enable Rapid Innovation in Integrated Energy Systems. ASME. ASME International Mechanical Engineering Congress and Exposition, Volume 14: Emerging Technologies; Materials: Genetics to Structures; Safety Engineering and Risk Analysis
- **Starke, Michael**; Xiao, Bailu; Liu, Guodong; Ollis, Ben; Irminger, Philip; King, Dan; Herron, Andrew; Xue, Yaosuo; Architecture and Implementation of Microgrid Controller, IEEE Innovative Smart Grid Technologies, 2016.
- Xiao, Bailu; **Starke, Michael**; King, Dan; Irminger, Philip; Herron, Andrew; Ollis, Ben; Xue, Yaosuo, Implementation of System Level Control and Communications in a Hardware-in-the-Loop Microgrid Testbed, IEEE Innovative Smart Grid Technologies, 2016.
- Ben Ollis, Philip Irminger, **Michael Starke**, Andrew Herron, Dan King, Bailu Xiao, Yaosuo Xue, Ben Knueven, Jim Ostrowski, “Economic Feasibility Analysis and Operational Testing of a Community Energy Storage System,” ECCE, September 2016.
- G. Liu, **M. Starke**, X. Zhang and K. Tomsovic “A MILP-Based Distribution Optimal Power Flow Model for Microgrid Operation,” Proceedings of the 2016 IEEE PES General Meeting, Boston, MA, Jul. 17-21, 2016.
- G. Liu, B. Xiao, **M. Starke**, O. Ceylan and K. Tomsovic, “A Robust Load Shedding Strategy for Microgrid Islanding Transition,” Proceedings of the 2016 IEEE PES T&D Conference & Exposition, Dallas, TX, May. 2-5, 2016.
- O. Ceylan, A. Dimitrovski, **M. Starke**, K. Tomsovic, “Optimal Reactive Power Allocation for Photovoltaic Inverters to Limit Transformer Tap Changes”, 2016 IEEE PES General Meeting, Boston MA, July 17-21
- G. Gurralla, A. Dimitrovski, S. Pannala, S. Simunovic, **M. Starke**, “Parareal in Time for Fast Power System Dynamic Simulations”, IEEE Transactions on Power Systems, Vol. 31, No. 3, 2016, pp. 1820-1830.
- Liu, Guodong; **Starke, Michael R**; Ceylan, Oguzhan; Tomsovic, Kevin; Advanced Energy Storage Management in Distribution Network, The 49th Hawaii International Conference on System Sciences (HICSS), January 2016.
- Ceylan, Oguzhan; Ollis, T Ben; **Starke, Michael R**; Irminger, Philip; Tomsovic, Kevin; A Regression Based Hourly Day Ahead Solar Irradiance Forecasting Model by Labview using Cloud Cover Data, 9th International Conference on Electrical and Electronics Engineering, November 2015.
- Xiao, Bailu; Prabakar, Kumaraguru; **Starke, Michael R**; Liu, Guodong; Dowling, Kevin; Ollis, T Ben; Irminger, Philip; Xu, Yan; Dimitrovski, Aleksandar D; Development of Hardware-in-the-loop Microgrid Testbed, IEEE Energy Conversion Congress and Exposition, September 2015.
- B. Johnson, **M. Starke**, A. Dimitrovski, “Examining the Potential Impact of Plug-In Electric Vehicles on Residential Sector Power Demand,” IEEE PES General Meeting, July 2015.

- Dimitrovski, Aleksandar D; Gurrala, Gurunath; **Starke, Michael R**; Pannala, Sreekanth; Simunovic, Srdjan; Parareal in Time for Fast Power System Dynamic Simulations, IEEE Transactions on Power Systems, July 2015.
- Irminger, Philip; **Starke, Michael R**; Ollis, T Ben; King, Daniel J; Labaza, Christine; Valencia, Pablo; Karlson, Peter; Thambiappah, Seelan; Parn, Karl; Massin, "Demand Charge Reduction, Power Factor Control, and Other Functions Using Secondary-Use Batteries", Advanced Automotive Battery Conferences June 2015.
- J. Nutaro, D. Fugate, T. Kuruganti, J. Sanyal, **M. Starke**, Cost Effective Retrofit Technology for Reducing Peak Power Demand in Small and Medium Commercial Buildings, Science and Technology for the Built Environment, 2015.
- B. Johnson, **M. Starke**, O. Abdelaziz, R. Jackson, and L. Tolbert, "A Dynamic Simulation Tool for Estimating Demand Response Potential from Residential Loads," in 6th Conference on Innovative Smart Grid Technologies (ISGT 2015), Washington, D.C., February 2014.
- J. Li, P. Jones. O. Onar, **M. Starke**, "Coupling electric vehicles and power grid through charging-in-motion and connected vehicle technology," *Electric Vehicle Conference (IEVC), 2014 IEEE International* , vol., no., pp.1,7, 17-19 Dec. 2014
- P. Irminger, **M. Starke**, A. Dimitrovski, M. Young, J. Stovall, D. Rizy, P. Overholt, "A Testing Platform for Validation of Aging Models and Understanding Thermal Limits of Overhead Conductors," IEEE PES General Meeting, July 2014.
- **M. Starke**, J. Nutaro, P. Irminger, B. Ollis, T. Kuruganti, D. Fugate, "Integration of Photovoltaics into Building Energy Usage through Advanced Control of Rooftop Units," 3rd International High Performance Buildings Conference at Purdue, July 14-17, 2014.
- J. Nutaro, D. Fugate, T. Kuruganti, **M. Starke**, "An inexpensive retrofit technology for reducing peak power demand in small and medium commercial buildings", Proceedings of the 3rd International High Performance Buildings Conference at Purdue, July 14-17, 2014.
- **M. Starke**, P. Irminger, B. Ollis, G. Andrews, O. Onar, P. Karlson, P. Valencia, S. Massin, A. Goodson, P. Rosenfeld, "Community Energy Storage with Secondary Use EV/PHEV Batteries," TechConnect 2014.
- B. Johnson, **M. Starke**, O. Abdelaziz, R. Jackson, and L. Tolbert, "A Method for Modeling Household Occupant Behavior to Simulate Residential Energy Consumption," in 5th Conference on Innovative Smart Grid Technologies (ISGT 2014), Washington, D.C., Feb. 19-22, 2014.
- B. Johnson, **M. Starke**, O. Abdelaziz, R. Jackson, and L. Tolbert, "A MATLAB Based Occupant Driven Dynamic Model for Predicting Residential Power Demand," in Transmission & Distribution Conference & Exposition (T&D 2014), Chicago, IL, Apr. 14-17, 2014
- **M. Starke**, D. Letto, N. Alkadi, R. George, B. Johnson, K. Dowling, S. Khan, Demand-side Response from Industrial Loads, TechConnect 2013.
- N. Alkadi, **M. Starke**, O. Ma, K. Dowling, B. Johnson, S. Khan, S. Nimbalkar, D. Cox, "IGATE-E (Industrial Geospatial Analysis Tool for Energy Evaluation)," 35th Industrial Energy Technology Conference.
- O. Ma, N. Alkadi, P. Cappers, P. Denholm, J. Dudley, S. Goli. M. Hummon, S. Kilicotte, J. MacDonald, N. Matson, D. Olsen, C. Rose, M. Sohn, **M. Starke**, B. Kirby, M. O'Malley, "Demand Response for Ancillary Services," IEEE Transactions on Smart Grid, December 2013.
- D. F. Howard, T. Smith, **M. Starke**, R. G. Harley, "Short circuit analysis of induction machines-wind power application" IEEE PES Transmission and Distribution Conference and Expo, May 2012.
- O. Onar, **M. Starke**, G. Andrews, R. Jackson, "Modeling, Controls, and Applications of Community Energy Storage Systems with Used EV/PHEV Batteries," IEEE Transportation Electrification Conference and Expo, June 2012.
- M Bradt, W Dilling, B Lanz, K Louis, T Nicolai, **M. Starke**, "Wind power plant testing and commissioning," PES General Meeting, July 2011, Page(s): 1-4.
- M. Bradt, B. Badrzadeh, E. Camm, D. Mueller, J. Schoene, T. Siebert, T. Smith, **M. Starke**, R. Walling, "Harmonics and Resonance Issues in Wind Power Plants," PES General Meeting, July 2011, Page(s): 1-8.
- D. F. Howard, J. Restrepo, T. Smith, **M. Starke**, J. Dang, R. G. Harley, "Calculation of Fault Current Contribution of Type I Wind Turbine-Generators" IEEE PES General Meeting, July 2011.

- M. Bradt, M. R. Behnke, T.A. Bellei, W. G. Bloethe, C. Brooks, E.H. Camm, W. Dilling, B. Goltz, J. Li, J. Niemira, K. Nuckles, J. Patiño, M. Reza, B. Richardson, N. Samaan, J. Schoene, T. Smith, I. Snyder, **M. Starke**, K. Tay, R. Walling, G. Zahalka, “Power Transformer Application for Wind Plant Substations,” 2010 IEEE PES, April 2010.
- M. Bradt, M. R. Behnke, T.A. Bellei, W. G. Bloethe, C. Brooks, E.H. Camm, W. Dilling, B. Goltz, J. Li, J. Niemira, K. Nuckles, J. Patiño, M. Reza, B. Richardson, N. Samaan, - J. Schoene, T. Smith, I. Snyder, **M. Starke**, K. Tay, R. Walling, G. Zahalka, “Design and Application of Cables and Overhead Lines in Wind Power Plants,” 2010 IEEE PES, April 2010.
- M. Bradt, M. R. Behnke, T.A. Bellei, W. G. Bloethe, C. Brooks, E.H. Camm, W. Dilling, B. Goltz, J. Li, J. Niemira, K. Nuckles, J. Patiño, M. Reza, B. Richardson, N. Samaan, J. Schoene, T. Smith, I. Snyder, **M. Starke**, K. Tay, R. Walling, G. Zahalka, “Arc-Flash Hazard in Wind Power Plants,” Transmission and Distribution Conference and Exposition, 2010 IEEE PES, April 2010.
- Dale Kaiser, G Palanisamy, S Santhana Vannan, Y Wei, T Smith, **M Starke**, M Wibking, Y Pan, Ranjeet Devarakonda, BE Wilson, The Wind ENergy Data and Information (WENDI) Gateway: New Information and Analysis Tools for Wind Energy Stakeholders,” AGU Fall Meeting, December 2010.
- **M. Starke**, L. Tolbert, B. Ozpineci, “AC Vs. DC: A Loss Comparison,” IEEE PES Transmission and Distribution Conference, April 2008, page(s): 1-7
- X. Yu, **M. Starke**, L. Tolbert, B. Ozpineci, “Fuel cell power conditioning for electric power applications: a summary,” Electric Power Applications, Vol. 1, Issue 5, Sept. 2007, page(s): 643-656.
- BL Burks, M Huffer, S Gabbert, **M Starke**, MJ Rennich, TW Burgess, SM Killough, JC Rowe, “Portable Manipulator Systems for Remote Maintenance at the ORNL Spallation Neutron Source Project,” 2004.

Reports

- G. Liu, M. Starke, B. Ollis, Y. Xue, “Networked Microgrid Scoping Study,” ORNL-TM2016, October 2016
- Roderick Jackson, Omer C. Onar, Harold Kirkham, Emily Fisher, Klaehn Burkes, **Michael Starke**, Olama Mohammed, George Weeks, Opportunities for Efficiency Improvements in the U.S. Electricity Transmission and Distribution System, ORNL/TM-2015/5, April 2015
- M. Starke, N. Alkadi, O. Ma, “Assessment of Industrial Load for Demand Response across US Regions of the Western Interconnect” 2013, ORNL/TM-2013/407.
- C. Narual, R. Martinez, O. Onar, **M. Starke**, G. Andrews, “Final report economic analysis of deploying used batteries in power systems,” 2011, ORNL/TM6.
- **M. Starke**, O. Onar, B. Devault, “Key Residential Building Equipment Technologies for Control and Grid Support – PART I (Residential),” ORNL/TM-2011/143, August 2011.
- D. Todd, M. Caufield, B. Helms, **M. Starke**, B. Kirby, J. Kueck, “Providing reliability services through demand response: A preliminary evaluation of the demand response capability of Alcoa Inc, 2008, ORNL/TM233.
- J. Hsu, M Staunton, **M. Starke**, “Barriers to the application of high-temperature coolants in hybrid electric vehicles,” 2006, ORNL/TM514.
- **M. Starke**, “Potential refrigerants for power electronics cooling,” 2005, ORNL/TM219.

Professional activities

- Member of IEEE Power and Energy Society (Institute of Electrical and Electronics Engineers) – Power Engineering Society