BANG NGUYEN

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IEEE Senior Member, Citations: 247, H-index: 10

SUMMARIES

- **Ph.D.** in Electrical and Computer Engineering and **5** years of industrial experience.
- **3+** years in Data Science, Machine Learning for power and energy systems.
- Proficient in developing machine learning algorithms for fault/anomaly detection in cyber-physical systems.
- **10+** years in designing and controlling power electronics systems.
- Modeling, real-time simulation and hardware-in-the-loop (CHIL and PHIL) for integrated power and energy systems.

EDUCATION

Clarkson University, NY, USA | Ph.D. Electrical and Computer Engineering,	2019–2022
Kyungpook National University, S. Korea | Doctoral coursework only,	2016–2018
HCMC Univ. of Tech. (HCMUT), Vietnam | M.E. Energy System Engineering,	2011–2013
HCMC Univ. of Tech. (HCMUT), Vietnam | B.E. Electrical and Electronics Engineering	2004–2010

EXPERIENCES

R&D Engineer 3
Los Alamos National Laboratory, NM, USA,
Manager: Henry Gaus, Dr. William Royal — Feb. 2023–present

- Leading the power electronic and pulsed power laboratory for applications in particle accelerator.
- Design new and better power supplies, pulse generator/modulators, solid-state amplifiers.
- Leading research projects such as beam chopper, high-voltage kicker, solid-state amplifiers.

Graduate Student Researcher
National Renewable Energy Laboratory, CO, USA,
Advisor: Dr. Rob Hovsapian, Dr. Mayank Panwar — June. 2021–Feb. 2023

Project (DOE): *Real-time simulation of smart grid with IoT devices and sensor networks.*

- Modeling of household devices such as thermostatic loads, solar panels, electric vehicles in the perspective of IoT communication via sensor networks.
- Real-time simulation of smart distribution grid with these IoT household devices on digital real-time simulation platforms such RTDS and Typhoon HIL.

Project (DOE): *Controller hardware in loop validation of hydrogen electrolyzer and fuel cell application for grid supports.*

- Modeling and controlling of a 750 kW hydrogen electrolyzer and 750 kW hydrogen fuel cell operating as an energy storage system that can produce green hydrogen (from renewable energy resources) and provide grid services.

Graduate Research Assistant
Clarkson University, NY, USA, Advisor: Dr. Tuyen Vu — Jan. 2019–Dec. 2022

Research in optimization, control and management of cyber-physical power systems as smart grids

- Dynamic state estimation and anomaly detection of smart grids following two approaches: 1) model-based: working with Kalman-based filtering considering unknown inputs for estimation and then constructing algorithms for anomaly detection by evaluating the residuals of estimation. 2) data-driven: employing machine learning tools to build Deep graph neural network models for estimation and detection.
- Dynamic modeling of microgrid using real-time simulator and hardware-in-loop*:* using OP5700 for real-time simulation of microgrid and NI compactRIO for hardware-in-loop.

Project (ONR): *Advance control and management for MVAC/MVDC ship power systems*

- Developing the four-zone shipboard power system using system modeling language (SysML) for model-based system engineering (MBSE) which supports validation and verification (V&V) progress.

Graduate Researcher
Kyungpook National University, S. Korea, Advisor: Dr. Honnyong Cha — Mar. 2016–Dec. 2018

Research in design and control of power converters

- Design and implement dual-out inverter using dual-buck structure which can withstand short circuit faults.
- Design and implement multi-port DC/DC converters for integrated power electronics interfaces.

Project: Design, implement and control of a 10-kW bidirectional dual-active-bridge converter including gate driver circuits, transformer, inductor, controller for vehicle to grid (V2G) charging station.

Lecturer
Eastern International University, Vietnam Jan. 2015–Jan. 2016
Teaching courses
- Fundamental of electric circuit, microelectronics circuit, experiments of electrical and electronics,

Researcher
HCMC Univ. of Tech. (HCMUT), Vietnam, Advisor: Dr. Nguyen Van Nho Feb. 2012–Dec. 2014
Research in design and control of multi-level inverters and applications
- Optimal PWM control (reduced common-mode voltage, voltage-balancing, power balancing) of multilevel inverters (cascaded H-bridge, neutral-point-clamped, hybrid inverters) utilizing the offset functions.
- Design and control of active filters, STATCOMs based on multi-level inverter structures.

Electrical Engineering Specialist
Binh Duong Electric Power Company - EVN, Vietnam, Aug. 2011–Sep. 2012
Planning, designing, optimizing and Quality controlling of power grids in Binh Duong area
- Design, plan, optimize and quality control of power grids in Binh Duong area to meet industrial and civil load needs in near future.
- Supervise, direct, and accept the technical operation of sub-section of Binh Duong grids.

Senior Supervisor
Foster Electric Limited Company, Vietnam Jan. 2009–Aug. 2011
Undertake both engineering and management tasks
- **Management**: liaison of the target and action plan for Headphone Assembly Department, planning, supervising and controlling the quality, quantity and efficiency of headphone manufacturing.
- **Engineering**: design and implement of apparatuses, jigs, supportive parts and components to improve efficiency.

AWARDS

IEEE NPSS Early Career Travel Grant | 2024 IEEE
IEEE Best Paper Award for the IEEE Industrial Electronics Magazine | 2021 IEEE
Graduate Research Assistantship | *Jan. 2020–Jun.2021* ONR Grant-USA
Graduate Teaching Assistantship | *Jan. 2019–Jan. 2020* Clarkson University-USA
Brain Korea 21 (BK21) Fellowship | *Mar. 2016–Dec. 2018* South Korean Government-KR
Graduate School Scholarship | *2016–2018* Kyungpook National University-KR
Students' Scientific Research Grant | *2013* HCMC Univ. of Tech. (HCMUT)-VN

SERVICES

Member: IEEE Senior Member and Technical Societies, **IEEE HKN Member**

- **Technical Program Committee Member**: 2023 IEEE Green Technologies Conference, Denver, CO.
- **Organizer and Chair of Special Section** – Power Electronics Converter and Control for Distributed and Renewable Energy Resources Integration: 2nd IEEE Industrial Electronics Society Annual Online Conference.
- **Clarkson University Ph.D. Committee Member**: Shuvangkar Das, Dissertation: "Identifying and Mitigating Sub-synchronous Oscillations in Power Systems with High Inverter-based Resources"
- **Clarkson University Ph.D. Committee Member**: Ha Ngo, Dissertation: "Graphical Learning based State Estimation for Power Distribution Systems"

Contributor: IEEE Task Force on Behind-The-Meter Distributed Energy Resources | IEEE Task Force on Cyber-Physical System Interdependence for Power Systems | IEEE Task Force on Solid-State Transformer and Potential Services for the Distribution Grid.

Reviewer: IEEE Trans. Power Electronics | Trans. Industrial Informatics | Trans. Power Systems | Trans. Smart Grid | Trans. Transportation Electrification | Trans. Industrial Applications | Automatica | IEEE Access | other journals and conferences

PUBLICATIONS

Book Chapter: **Bang Nguyen** and Tuyen Vu "Fault Detection in Distribution Grid with Spatial-Temporal Recurrent Graph Neural Networks", *Big Data Application in Power Systems*, *Elsevier*, 2023. (*under review*)

Book Chapter: Tuyen Vu and **Bang Nguyen** "Design of state estimators for controls of power systems", *Encyclopedia of Electrical and Electronic Power Engineering*, *Elsevier*, 2022.

Report: "Cyber-Physical Interdependence for Power System Operation and Control", by *IEEE Task Force Report on Cyber-Physical Interdependence for Power System Operation and Control*. https://resourcecenter.ieee-pes.org/publications/technical-reports/pes_tr_tr119_psope_122823.

Report: "Behind-The-Meter Distributed Energy Resources: Estimation, Uncertainty Quantification, and Control (TR111)", by *IEEE Task Force on Behind-The-Meter Distributed Energy Resources: Estimation, Uncertainty Quantification, and Control*. https://resourcecenter.ieee-pes.org/publications/technical-reports/PES_TP_TR111_SBLCS_60623.html.

Report: "Power Converter for Electrolyzer Applications", DOE Hydrogen and Fuel Cell Technologies Office, 2022 Annual Merit Review & Peer Evaluation Meeting. https://www.hydrogen.energy.gov/pdfs/review22/ta035_hovsapian_2022_p.pdf

Journals

[10] Quang-Ha Ngo, **Bang L.H. Nguyen**, Tuyen V. Vu, Jianhua Zhang, Tuan Ngo, "Physics-informed graphical neural network for power system state estimation," *Applied Energy*, Vol. 358, Mar. 2024.

[9] Linh Vu, Thai-Thanh Nguyen, **Bang Le-Huy Nguyen**, Md. Isfakul Anam, Tuyen Vu, "Real-time hybrid controls of energy storage and load shedding for integrated power and energy systems of ships," *Electric Power Systems Research*, Vol. 229, Apr. 2024.

[8] **Bang L. H. Nguyen**, T. V. Vu, T. -T. Nguyen, M. Panwar and R. Hovsapian, "Spatial-Temporal Recurrent Graph Neural Networks for Fault Diagnostics in Power Distribution Systems," in *IEEE Access*, vol. 11, pp. 46039-46050, 2023, doi: 10.1109/ACCESS.2023.3273292.

[7] Bui Ngoc-Thang, Thi My Tien Nguyen, Trong Toai Truong, **Bang Le-Huy Nguyen**, Tuy Tan Nguyen, "A Dynamic Reconfigurable Wearable Device to Acquire High Quality PPG Signal and Robust Heart Rate Estimate Based on Deep Learning Algorithm for Smart Healthcare System," *Biosensors and Bioelectronics: X, Volume 12, 2022, 100223.*

[6] Ngoc-Thang Bui, Thi My Tien Nguyen, **Bang Le-Huy Nguyen**, Thi Thu Ha Vu, Cong Hoan Nguyen, Quoc Cuong Bui, Sumin Park, Jaeyeop Choi and Trong Toai Truong, "Improved Accuracy of Optical Distance Sensor Based on Artificial Neural Network Applied to Real-time Systems," *2022 Meas. Sci. Technol. 33 075001.*

[5] **Bang L.H. Nguyen**, Tuyen V. Vu, Joseph M. Guerrero. Mischael Steurer, Karl Schoder and Tuan Ngo, "Distributed Dynamic State-Input Estimation for Power Networks of Microgrids and Active Distribution Systems with Unknown Inputs," *Electric Power Systems Research*, Vol. 201, 2021.

[4] Tuyen Vu, **Bang Nguyen**, Zheyuan Cheng, Mo-Yuen Chow and Bin Zhang, "Cyber-Physical Microgrids: Toward Future Resilient Communities," *Industrial Electronics Magazine*, vol. 14,no. 3,pp. 4-17, Sept. 2020.

[3] T. Nguyen, H. Cha, **B. L. Nguyen** and H. Kim, "A Novel Single-Phase Three-Level Dual-Buck Inverter," in *IEEE Transactions on Power Electronics*, vol. 35, no. 4, pp. 3365-3376, April 2020.

[2] D. Do, H. Cha, **B. L. Nguyen** and H. Kim, "Two-Channel Interleaved Buck LED Driver Using Current-Balancing Capacitor," *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 6, no. 3, pp. 1306-1313, Sept. 2018.

[1] **B. L. Nguyen**, H. Cha and H. Kim, "Single-Phase Six-Switch Dual-Output Inverter Using Dual-Buck Structure," *IEEE Transactions on Power Electronics*, vol. 33, no. 9, pp. 7894-7903, Sept. 2018.

Conference papers

[18] **Bang Nguyen**, Henry Gaus III, Gregory Dale, Joe Bradley III, "Synopsis of Pulse Modulator for Beam Chopper in LANSCE Particle Accelerator," *2nd IEEE Industrial Electronics Society Annual Online Conference,* Dec. 8-10, 2023.

[17] Q. -H. Ngo, **B. L. H. Nguyen**, T. V. Vu and T. Ngo, "State Estimation for Power Distribution System Using Graph Neural Networks," *2023 IEEE Electric Ship Technologies Symposium (ESTS)*, Alexandria, VA, USA, 2023, pp. 441-446, doi: 10.1109/ESTS56571.2023.10220523.

[16] **Bang L. H. Nguyen**, T. Vu, T. -T. Nguyen, M. Panwar and R. Hovsapian, "1-D Convolutional Graph Convolutional Networks for Fault Detection in Distributed Energy Systems," *2022 IEEE 1st Industrial Electronics Society Annual On-Line Conference (ONCON)*, kharagpur, India, 2022, pp. 1-6, doi: 10.1109/ONCON56984.2022.10126859.

[15] **Bang L. H. Nguyen**, M. Panwar, R. Hovsapian, Y. Agalgaonkar and T. Vu, "Hierarchical Control of Grid-Connected Hydrogen Electrolyzer Providing Grid Services," *2022 IEEE 1st Industrial Electronics Society Annual On-Line Conference (ONCON)*, kharagpur, India, 2022, pp. 1-6, doi: 10.1109/ONCON56984.2022.10126806.

[14] **Bang L.H. Nguyen**, Tuyen Vu, Thai-Thanh Nguyen, Mayank Panwar, and Rob Hovsapian, "Integrated Multiport Back-to-Back Power Converter for Type-4 Wind Turbine Generator with Hybrid Energy Storage System," *IECON 2022 – 48th Annual Conference of the IEEE Industrial Electronics Society*, pp. 1-6, 2022.

[13] T. Nguyen, **B. L. Nguyen** and T. Vu, "Resilience-Oriented Energy Management System for Ship Power Systems," 2022 IEEE Power & Energy Society General Meeting (PESGM), Denver, CO, USA, 2022.

[12] **Bang L.H. Nguyen**, Mayank Panwar, Rob Hovsapian, K. Nagasawa, and Tuyen V. Vu, "Power Converter Topologies for Electrolyzer Applications to Enable Electric Grid Services," *IECON 2021 – 47th Annual Conference of the IEEE Industrial Electronics Society*, pp. 1-6, 2021.

[11] **Bang L.H. Nguyen**, Honnyong Cha, Tuyen V. Vu, Thai-Thanh Nguyen, "Integrated Multiport Bidirectional DC-DC Converter for HEV/FCV Applications," *IECON 2021 – 47th Annual Conference of the IEEE Industrial Electronics Society*, pp. 1-6, 2021.

[10] **Bang L.H. Nguyen**, Tuyen Vu, Colin Ogilvie, Harsha Ravindra, Mark Stanovich, Karl Schoder, Michael Steurer, Charalambos Konstantiou, Herbert Ginn, and Schristian Schegan "Advanced Load Shedding for Integrated Power and Energy Systems," *2021 IEEE Electric Ship Technologies Symposium (ESTS)*, pp. 1-6, 2021.

[9] **Bang Nguyen**, Tuyen Vu, Thomas Ortmeyer and Tuan Ngo, ”Distributed Dynamic State Estimation for Microgrids,” *2020 IEEE PES General Meeting*, Montreal, August 2-6 2020.

[8] Linh Vu, Tuan Ngo, **Bang Nguyen**, Tuyen Vu ”Decoupling Proportional-Resonant Controllers for Positive and Negative Sequences under Unbalanced Voltages and Frequency Variations,” *2020 IEEE PES General Meeting*, Montreal, August 2-6 2020.

[7] T. V. Vu, **B. H. L. Nguyen**, T. A. Ngo, M. Steurer, K. Schoder and R. Hovsapian, ”Distributed Optimal Dynamic State Estimation for Cyber Intrusion Detection in Networked DC Microgrids,” *IECON 2019 - 45th Annual Conference of the IEEE Industrial Electronics Society*, Lisbon, Portugal, 2019, pp. 4050-4055.

[6] **L. H. Bang Nguyen**, T. V. Vu and T. A. Ngo, ”Decentralized Dynamic State Estimation in Microgrids,” *2019 IEEE Electric Ship Technologies Symposium (ESTS)*, Washington, DC, USA, 2019, pp. 257-262.

[5] **B. L. Nguyen**, H. Cha, T. Nguyen and H. Kim, ”Family of Integrated Multi-Input Multi-Output DC-DC Power Converters,” *2018 International Power Electronics Conference (IPEC-Niigata 2018 -ECCE Asia)*, Niigata, 2018, pp. 3134-3139.

[4] T. Nguyen, H. Cha, **B. L. Nguyen** and H. Kim, ”Novel T-type Dual-Buck Inverter with Minimum Number of Inductors,” *2018 International Power Electronics Conference (IPEC-Niigata 2018 -ECCE Asia)*, Niigata, 2018, pp. 1046-1050.

[3] Jongwoo Bae, **B. L. H. Nguyen** and Honnyoung Cha, ”A Novel Battery Formation Equipment Using Two-stage Differential Buck Converter,” *2016 IEEE Transportation Electrification Conference and Expo, AsiaPacific (ITEC Asia-Pacific)*, Busan, 2016, pp. 740-744.

[2] **N. L. H. Bang**, N. V. Nho, N. K. T. Tam, N. M. Dung ”A Phase Shifted PWM Technique for Common-mode Voltage Reduction in Five Level H-bridge Cascaded Inverter,” *International Conference and Utility Exhibition 2014 on: Green Energy for Sustainable Development (ICUE)*, Mar. 2014, Thailand.

[1] **N. L. H. Bang**, N. V. Nho, N. K. T. Tam, N. M. Dung ”Simulation and Experiment of Hybrid Modulation Strategy with Common-mode Voltage Reduction for Seven-level Hybrid Cascaded Inverter,” *International Conference and Utility Exhibition 2014 on: Green Energy for Sustainable Development (ICUE)*, Mar. 2014, Thailand.