

Georgios I. Orfanoudakis

Curriculum Vitae

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Personal Information

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Summary

Associate Professor of Power Electronics & Motor Drives at the HMU (Crete, Greece) and R&D expert with over 12 years of hands-on industrial consulting experience alongside a distinguished academic track record. Proven success in designing, modeling, and validating high-power motor drives (up to 616kVA) and grid-connected converters for renewable energy integration. A specialist in advanced control algorithms, digital control implementation, and intellectual property creation, holding 8 patents (OBI, EPO, USPTO, WO) and over 50 peer-reviewed publications. Highly experienced in bridging the gap between cutting-edge academic research and commercial product development.

Research / R&D expertise

Extensive research & R&D experience in the following fields:

- Electrical design and control of power converters for motor drives and grid integration of distributed energy sources.
- Design and control of three-level and multilevel power converters (NPC, Cascaded H-Bridge, Hybrid/Modular Multilevel Converters, etc).
- Inverter topologies for photovoltaic (PV) systems and transformerless PV inverters.
- Advanced Pulse Width Modulation (PWM) techniques.
- Control of DC and AC electric motors (synchronous/induction) via power converters, with emphasis on Vector control methods for three-phase AC motors.
- Phase-Locked Loops (PLLs), observers, and their application in sensorless motor control and grid synchronization.
- Filter design for inverters and control methods to mitigate resonance phenomena.
- Power quality and Electro-Magnetic Compatibility (EMC) of power converters.
- Methods for reducing common-mode ground leakage currents from inverters.
- Methods to extend the operating boundaries of inverter-driven electric motors using overmodulation, 6-step operation, and field weakening.
- Current balancing methods for three-phase inverters.

- Sensorless drive systems for remote motors and techniques addressing phenomena related to long cables (resonances, overvoltages, leakage currents, low-speed control impacts).
- Modeling of power converters and their controllers, and simulation in MATLAB/Simulink.
- Discretization of converter controllers; implementation on microcontrollers and validation with Hardware-In-the-Loop (HIL) and testing.

Research / R&D Projects

Project Title	Funding Source	Period	Role
Design and control of variable-speed drives for oil and water pumping applications	TSL Technology Ltd, UK	5/2025 – present	Principal Investigator, Coordinator
Incorporating advanced features in variable-speed drives for permanent-magnet and induction motors	TSL Technology Ltd, UK	2/2024 – 2/2025	Principal Investigator, Coordinator
Enhancing resilience of Cretan power system using distributed energy resources (CResDER)	2nd Call for H.F.R.I. Research Projects for Faculty Members and Researchers	1/2022 – 7/2024	Research Associate
Principle and control of high-efficiency Buck-Boost type photovoltaic inverter (eSOLAR)	NSRF 2014-2020, Competitiveness Entrepreneurship and Innovation, Bilateral & Multilateral R&T Cooperation Greece-China	4/2020 – 10/2023	Key Research Associate
Research and development on variable-speed drives for permanent magnet and induction motors	TSL Technology Ltd, UK	9/2022 – 9/2023	Principal Investigator, Coordinator
Research and development on variable-speed drives for permanent magnet motors	TSL Technology Ltd, UK	9/2021 – 9/2022	Principal Investigator, Coordinator
Research and development on variable-speed motor drives	TSL Technology Ltd, UK	9/2020 – 9/2021	Principal Investigator, Coordinator

Research and R&D Experience

June 2015 – Present

TSL Technology Ltd. – Magnetic Pumping Solutions (MPS)

R&D Consultant for the design and control of Variable Speed Drives (VSDs) rated from 58 to 616 kVA.

Scope of work:

- Technical leadership and detailed guidance to a team comprising electronics engineers, software and gateway (FPGA) engineers, and technicians, for electrical design, firmware/FPGA implementation and experimental laboratory testing.
- Electrical design of Variable Speed Drives rated from 58 to 616 kVA.
- Study and implementation of vector control for permanent magnet synchronous motors operating under 6-step voltage, resulting in a co-authored publication and patent.
- Study and implementation of a Voltage Sag Ride Through (VSRT) algorithm for permanent magnet and induction motors.
- Analysis of the backspin phenomenon in centrifugal pumps driven by permanent magnet motors, and design-implementation of appropriate braking methods.
- Study, simulation, and implementation of a startup and control method for induction motors driven through long power cables.
- Study and simulation of advanced input filters and 12-18-24 pulse rectifiers for motor drives.
- Support for the implementation of software tools used for designing pumping systems equipped with motor drives.
- Study and implementation of vector control with extended capabilities (overmodulation, current balancing, ultra-low speed operation, etc.).
- Study and implementation of sensorless motor control methods for driving remote motors connected via asymmetrical cables across a wide speed range.
- Modeling of power converters and their controllers for motor control using scalar and vector methods, with simulation in MATLAB/Simulink.
- Discretization of controllers, gain tuning, stability analysis, and implementation on microcontrollers using embedded C.
- Electromagnetic compatibility (EMC) studies of power drives based on IEC 61800-3 standards.
- Design and implementation of protections for variable speed drives (short-circuit, overcurrent, DC-link overvoltage, etc.) and motors (overtemperature, overspeed/overtorque, etc.).
- Design, modeling and implementation of back-to-back converter control architectures for factory testing with low energy consumption.
- Design and modeling of control architectures for parallel connection of drives to achieve a total power of $2 \times 616 = 1232$ kVA.
- Design and implementation of special features for centrifugal and Progressive Cavity Pumps (PCP), such as flying start, braking, and step-up transformer startup avoiding saturation.
- Study of phenomena related to long motor cables and implementation of mitigation methods.
- Technical troubleshooting support during laboratory testing and external field commissioning.
- Compilation of several (> 40) technical reports.

Apr. 2020 – Oct. 2023

Technical University of Crete

Research Associate for the eSOLAR project, studying and implementing a transformerless PV inverter topology.

Scope of work:

- Study and simulation of the Aalborg-type full-bridge PV inverter topology and its variants, including its control loops.
- Complete electrical schematic and layout design for two experimental prototypes; the second intended for grid integration, featuring galvanic isolation and isolated auxiliary power supplies.
- Implementation of closed-loop current controllers on microcontrollers using MATLAB/Simulink – Embedded Coder.
- Study of alternative Maximum Power Point Tracking (MPPT) algorithms and optimization of converter performance parameters.
- Supervision and technical support during prototype assembly and algorithm implementation.
- Co-authoring 5 conference papers and participating in drafting 2 patent applications (OBI - EPO).

Oct. 2012 – Oct. 2014

University of Southampton & TSL Technology Ltd.

Research Associate for the design and control of motor drives rated 50 to 320 kVA, within a Knowledge Transfer Partnership (KTP) framework.

Scope of work:

- Design of power converters (selection of rectifier diodes/thyristors, IGBTs, inductors, DC-link capacitors, and loss estimation/minimization).
- Design of LC filters for sinusoidal output voltages and implementation of methods to prevent resonance phenomena.
- Analysis of common-mode ground leakage current issues in variable speed drives and investigation of mitigation methods.
- Analysis of instability issues caused by unbalanced cables and proposal of counter-measures.
- Analysis of low-speed, high-torque operation and improvement of control through a configurable digital integrator.
- Improvement of permanent magnet motor startup sequence (company trade secret).
- Analysis of the destructive backspin phenomenon in Progressive Cavity Pumps (PCP) driven by permanent magnet motors and design of braking methods.
- Validation of all the above through extensive MATLAB/Simulink simulations and laboratory experimental tests.
- Theoretical formulation and implementation of automatic drive parameter identification based on motor nameplate ratings.
- Contribution to the design of the GUI, installation/user manuals, and factory testing protocols.
- Participation in international collaborative testing with pump manufacturers in Manchester (UK), Champtocé-sur-Loire (France), and Michigan (USA).
- Authoring a series of comprehensive technical reference documents.

Visiting Fellowships

Oct. 2014 – Present

University of Southampton, UK

Visiting Fellow at the University of Southampton, collaborating with Professor Suleiman Sharkh (Professor of Power Electronics, Machines and Drives – Head of the Electro-Mechanical Engineering research group).

Scope of collaboration:

- Co-supervision of PhD candidates as an external supervisor and support in writing scientific publications.
- Studies on inverter topologies and control architectures for motor drives and grid integration of distributed generation, yielding joint scientific papers.
- Impact analysis of motor control under non-standard operating conditions (e.g., unbalanced voltages/currents, non-sinusoidal supply) utilizing theoretical and Finite Element Analysis (FEA).

Supervision of PhD Candidates

Sept. 2023 – Present

Hellenic Mediterranean University (HMU), Dept. of ECE

Co-supervising three (3) PhD candidates:

- «Innovative multilevel power converters and their application on energy storage systems», Michail Dakanalis – In progress (Main Supervisor).
- «Design and development of novel electronic devices for the electrical characterization and power conversion in emerging technologies», Ioannis Kalogerakis – In progress (Main Supervisor).
- «Long term stability and aging study of small- and large-scale emerging PV technologies in lab and outdoor conditions», Emmanuil Spiliarotis – In progress (Thesis committee member).

Jan. 2022 – Present

University of Southampton, UK

Co-supervising two (2) PhD candidates as an external supervisor:

- «In-situ EIS and Management of a Grid Connected Battery using an NPC Inverter», Kai-Ping Liu – Completed in December 2024.
- «Power converters for hybrid energy storage», Hendras Dwi Wahyudi – In progress.

Teaching Experience

Oct. 2019 – Present

Hellenic Mediterranean University (HMU), Dept. of ECE

Scientific Associate / Assistant Professor since 11/2/2020 – Associate Professor since 19/3/2026.

Taught Courses:

- Undergraduate courses: "Power Electronics", "Electrical Machines I", "Electrical Machines II", and "Electrical Drive Systems" (Theory & Laboratory sessions).
- Postgraduate courses (MSc in Energy Systems): "Coupling of Energy Systems and Power Electronics" and co-teaching of "Electrical Energy Measurement – Power Quality".

Supervision of MEng (ECE), Master's, and Bachelor's (Electrical Eng.) theses:

Supervised over 30 MEng and MSc theses focusing on the hardware implementation and real-time embedded control of DC-DC converters, grid-tied PV inverters, hybrid/multilevel inverters, and leakage current suppression circuits.

1. «Study and construction of an inverter using the IRAM256-1067A power integrated circuit», A. Grigoratos, Sept. 2020.
2. «Review of technology and regulatory framework of charging stations for electric vehicles - guidelines for installation at HMU», E. Geredakis, Jan. 2021 (Master's thesis).
3. «Design and construction of a microcontroller-controlled 2.2 kW step-down DC-DC converter», G. Andreou - G. Andrianidis, Apr. 2021.
4. «Study and construction of a microcontroller-controlled switching step-up DC-DC converter», N. Giakoumakis, Mar. 2022.
5. «Field-oriented control of a three-phase synchronous machine via a microcontroller-driven inverter», G. Kotoulas, June 2022.
6. «Study and experimental investigation of a microcontroller and inverter setup for field-oriented control of a three-phase synchronous machine», M. Apostologorgakis - S. Koskinas, July 2022.
7. «Implementation of an inverter prototype controller fed by a step-up converter for leakage current reduction in PV systems», I. Meramveliotakis, Aug. 2022.
8. «Basic principles of operation, installation, and programming of a low-cost system for remote monitoring and control of electrical installations», A. Kolaini - Ch. Kaisas, Sept. 2022.
9. «Study and construction of a 1kW step-up DC-DC converter», K. Dandolo, Oct. 2022.
10. «Investigation and comparison of electrical machines for electric vehicles», M. Lami, Apr. 2023.
11. «Study and construction of an Arduino-controlled 48V – 200W switching step-down DC-DC converter», G. Frazeskaros, May 2023.
12. «Control of a Three-Phase Multilevel Cascaded H-Bridge Converter», G. Stavrakis, May 2024.
13. «Design and construction of a multilevel step-up DC/DC converter», I. Meramveliotakis, July 2024 (Master's thesis).
14. «Design and implementation of an uninterruptible power supply (UPS) system with multiple DC outputs», B. Bakatsakis, June 2024.
15. «Health and safety in the electrical machines and power electronics laboratory of HMU», N. Chatzinikitas, July 2024.
16. «Investigation of methods and components for isolated voltage-current measurement in power converters», A. Lazari, Oct. 2024.
17. «Design and construction of a circuit for generating complementary pulse trains with adjustable dead time», G. Varellakis, Oct. 2024.
18. «Study of an electrical installation with power converters for a borehole», A. Dapontes, Dec. 2024.
19. «Implementation of an inverter controller for interfacing a DC voltage source to the electrical grid», E. Kalogerakis, Feb. 2025.
20. «Health and safety of electrical works on a public project construction site», M. Kokosalis, Feb. 2025.
21. «Design and construction of a three-level cascaded H-bridge inverter», A. Minasian, May 2025.

22. «Health and safety in the electrical sector of vocational high schools», Z. Papakostas, June 2025.
23. «Study and implementation of a controller for a hybrid multilevel DC-to-DC converter», G. Kotoulas, Sept. 2025.
24. «Presentation and comparison of commercial DC fast chargers for electric cars», D. Dramilaris, Dec. 2025.
25. «Study and implementation of a modified motor drive controller for leakage current reduction», Ev. Zakatiras, Feb. 2026.
26. «Study and implementation of a modified PV inverter controller for leakage current reduction», Ath. Portokallidis, Feb. 2026.
27. «Study and simulation of a multilevel scalar converter control for ancillary services provision», K. Malesiadas, May 2026.
28. «Design and construction of a circuit for leakage current reduction in electric motor drives», S. Argyros, July 2026.
29. «Techno-economic analysis of an offshore green hydrogen production unit from wave energy», O. Biti, Aug. 2026.
30. «Design and construction of a power converter circuit for driving electrical machines», G. Delipanagiotis, Sept. 2026.
31. «Presentation and comparison of commercial hybrid inverter products for photovoltaics and battery energy storage», A. Toskou (In progress).
32. «Implementation and validation of a controller for a hybrid multilevel step-down DC converter», K. Tsiatsios, Oct. 2026.
33. «Design and construction of circuits for a hybrid multilevel step-down DC converter», F. Skourtaniotis (In progress).
34. «Investigation and analysis of leakage currents in installations with power converters for electric motors», S. Bagordakis (In progress).
35. «Sizing and loss comparison of scalar multilevel converters using simulation», S. Koskinas (Master's thesis, In progress).

Oct. 2015 – Sept. 2019

TEI of Crete, Department of Electrical Engineering
Scientific/Laboratory Associate and University Fellow.

Taught Courses:

- "Power Electronics" (Theory & Lab).
- "Electrical Drive Systems" (Theory & Lab).
- Laboratory associate for "Electrical Machines I" and "Electrical Machines II" (2015-16).
- Co-teaching of "Power Electronics and Interfacing Technologies" in the MSc Energy Systems program (Spring 2016).

Theses Supervision:

- «Design of a grid-connected three-phase inverter and study of behavior under grid fault conditions», D. Papastefanakis, June 2018 (Master's thesis).
- «Motor vector control for an electric car – Investigation and simulation in MATLAB-Simulink», M. Giannaros, June 2018.

Feb. 2009 – Dec. 2010

University of Southampton, UK

Teaching assistant for "Electrical Systems" tutorials, lab demonstrator for "Electrical Motors", and coordinator of educational electrical machine lab sessions for school students.

Publications

Book Chapters

1. S. M. Sharkh, M. A. Abu-Sara, G. I. Orfanoudakis, and B. Hussain, "Power Electronic Converters for Microgrids", John Wiley & Sons, ISBN 978-0-470-82403-0, April 2014 (Chapters 2 – 5).

Scientific Journals

1. G. I. Orfanoudakis, A. Cordeiro, D. Foito, A. J. Pires and V. Fernão Pires, "Dual-Inverter-Fed Six-Phase Open-End Winding Symmetrical and Asymmetrical Motor Drives Based on a Nine-Switch Converter With a Single DC Supply," in *IEEE Access*, vol. 14, pp. 149108-149120, 2026, doi: 10.1109/ACCESS.2026.3736840.
2. K.-P. Liu, G. I. Orfanoudakis, A. J. Cruden and S. M. Sharkh, "In Situ EIS for Batteries With a Three-Phase Neutral Point Clamped Converter Interface," in *IEEE Transactions on Power Electronics*, vol. 41, no. 11, pp. 20321-20333, Nov. 2026, doi: 10.1109/TPEL.2026.3711715.
3. E. Pompodakis, G. I. Orfanoudakis, G. Arnaoutakis, and D. Katsaprakakis, "Toward multi-gigawatt transmission systems: Optimization and techno-economic analysis of high-temperature superconducting cables," *Electric Power Systems Research*, vol. 261, p. 113333, 2026, doi: 10.1016/j.epsr.2026.113333.
4. A. Levhar, L. K. Pittala, G. I. Orfanoudakis, R. Mandrioli, M. M. Peretz and A. Kuperman, "Hybrid Dual-Winding Active Magnetic Energy Harvester to Supply a Constant Power Load Under Varying Primary Current Magnitudes," in *IEEE Open Journal of Power Electronics*, vol. 7, pp. 631-641, 2026, doi: 10.1109/OJPEL.2026.3663739.
5. E. Pompodakis, A. Ahmed, G. Orfanoudakis, and D. Katsaprakakis, "A MILP optimization approach for optimizing primary frequency control of wind turbines in low-inertia islands," *Wind Energy and Engineering Research*, vol. 5, p. 100024, 2026, doi: 10.1016/j.weer.2026.100024.
6. L. K. Pittala, A. Chub, G. I. Orfanoudakis, A. Kuperman, M. Ricco and R. Mandrioli, "Active Power Sharing Control in Asymmetrical Bidirectional DC/DC Converter," in *IEEE Open Journal of Power Electronics*, vol. 6, pp. 1980-1990, 2025, doi: 10.1109/OJPEL.2025.3630546.
7. E. E. Pompodakis and G. I. Orfanoudakis, "Efficient integration of buck converter into an active rectifier for DC-fault current limitation in DC networks," *e-Prime – Adv. Electr. Eng., Electron. Energy*, vol. 13, p. 101053, 2025.
8. E. E. Pompodakis, G. I. Orfanoudakis and T. A. Papadopoulos, "Communication-Free Protection Scheme With Improved Selectivity and Backup Reliability for Ring DC Networks," in *IEEE Access*, vol. 13, pp. 109579-109592, 2025.
9. G. I. Orfanoudakis, E. Koutroulis, G. Foteinopoulos and W. Wu, "Analysis and Reduction of Common-Mode Ground Leakage Current for Transformerless PV Inverters with Rectified Sinewave DC-link Voltage," in *Springer Journal of Power Electronics*, June 2025. (doi: 10.1007/s43236-025-01106-1)
10. E. Pompodakis, G. I. Orfanoudakis, G. Katsigiannis, A. Tsikalakis, and E. Karapidakis, "A novel power flow approach for calculating the steady-state of secondary control in islanded microgrids under cyberattacks," in *Sustainable Energy, Grids and Networks*, vol. 42, p. 101646, 2025.

11. A. Abramovitz, M. Shvartsas, G. I. Orfanoudakis and A. Kuperman, "Performance Assessment of Clamped-On Passive Magnetic Energy Harvester Matched to a Constant Voltage Load under Wide Range of Primary Currents," in *IEEE Transactions on Aerospace and Electronic Systems*, Feb. 2025.
12. E. Pompodakis, A. Ahmed, C. Condaxakis, G. I. Orfanoudakis, and E. Karapidakis, "Paving the way toward hydrogen mobility: An effective policy to reduce the green hydrogen cost," in *International Journal of Hydrogen Energy*, vol. 100, pp. 417–427, 2025.
13. T. Christos, E. Pompodakis, and G. I. Orfanoudakis, "Techno-economic feasibility of fuel cell vehicle-to-grid fast frequency control in non-interconnected islands," in *Hydrogen*, vol. 6, p. 1, 2025.
14. G. I. Orfanoudakis, G. Foteinopoulos, E. Koutroulis and W. Wu, "Dynamic Self-Reconfiguration of a Buck-Boost PV Inverter for Maximum Energy Harvesting," in *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 72, no. 5, pp. 2408-2418, May 2025.
15. A. Abramovitz, M. Shvartsas, G. I. Orfanoudakis and A. Kuperman, "Output Characteristics of Passive Magnetic Energy Harvester Feeding a Constant-Voltage-Type Load," in *IEEE Journal of Emerging and Selected Topics in Power Electronics*, doi: 10.1109/JESTPE.2024.3476284.
16. E. Pompodakis, G. I. Orfanoudakis, Y. Katsigiannis, and E. Karapidakis, "Techno-economic feasibility analysis of an offshore wave power facility in the Aegean Sea, Greece," *Energies*, vol. 17, no. 18, p. 4588, 2024.
17. E. Pompodakis, A. Ahmed, G. I. Orfanoudakis, and E. Karapidakis, "Optimization of residential hydrogen facilities with waste heat recovery: Economic feasibility across various European cities," in *Processes*, vol. 12, no. 9, p. 1933, 2024.
18. E. Pompodakis, G. I. Orfanoudakis, Y. Katsigiannis, and E. Karapidakis, "Hydrogen production from wave power farms to refuel hydrogen-powered ships in the Mediterranean Sea," in *Hydrogen*, vol. 5, no. 3, pp. 494–518, 2024.
19. E. Pompodakis, G. I. Orfanoudakis, Y. Katsigiannis, and E. Karapidakis, "Robust secondary controller for islanded microgrids with unexpected electrical partitions under fault conditions," in *Energies*, vol. 17, no. 15, p. 3727, 2024.
20. G. I. Orfanoudakis, E. Lioudakis, G. Foteinopoulos, E. Koutroulis and W. Wu, "Dynamic Global Maximum Power Point Tracking for Partially Shaded PV Arrays in Grid-Connected PV Systems," in *IEEE Journal of Emerging and Selected Topics in Industrial Electronics*, vol. 5, no. 4, pp. 1481-1492, Oct. 2024.
21. G. I. Orfanoudakis, M. A. Yuratich and S. M. Sharkh, "Current balancing of scalar-controlled induction motors with long imbalanced cables for artificial lift systems," in *e-Prime – Advances in Electrical Engineering, Electronics and Energy*, vol. 7, p. 100391, 2024.
22. G. I. Orfanoudakis, E. Koutroulis, S. M. Sharkh and M. A. Yuratich, "An Extended Boost Three-Phase Transformerless PV Inverter for Common-Mode Leakage Current Reduction," in *IEEE Transactions on Industry Applications*, vol. 60, no. 1, pp. 838-850, Jan.-Feb. 2024.
23. G. I. Orfanoudakis, S. M. Sharkh and M. A. Yuratich, "Combined Positive-Sequence Flux Estimation and Current Balancing for Sensorless Motor Control Under Imbalanced Conditions," in *IEEE Transactions on Industry Applications*, vol. 57, no. 5, pp. 5099-5107, Sept.-Oct. 2021.
24. G. I. Orfanoudakis, M. A. Yuratich and S. M. Sharkh, "Nearest-Vector Modulation Strategies with Minimum Amplitude of Low-Frequency Neutral-Point Voltage Oscillations for the Neutral-Point-Clamped Converter", *IEEE Transactions on Power Electronics*, vol. 28, no. 10, pp. 4485-4499, Oct. 2013.
25. G. I. Orfanoudakis, M. A. Yuratich and S. M. Sharkh, "Hybrid Modulation Strategies for Eliminating the Low-Frequency Neutral-Point Voltage Oscillations in the Neutral-Point-Clamped Converter", *IEEE Transactions on Power Electronics*, vol. 28, no. 8, pp. 3653-3658, Aug. 2013.

26. G. I. Orfanoudakis, M. A. Yuratich and S. M. Sharkh, "Analysis of DC-link Capacitor Current in Three-Level Neutral-Point-Clamped and Cascaded H-Bridge Inverters", IET Power Electronics, vol. 6, no. 7, pp. 1376-1389, Aug. 2013.

International Peer-Reviewed Conferences (Full Papers)

1. G. Orfanoudakis, I. Meramveliotakis, A. Kuperman, R. Mandrioli and E. Pompodakis, "A Reduced-Component Hybrid Cascaded DC/DC Converter Family with Complementary Arm Operation," accepted for presentation in the 22nd International Power Electronics and Motion Control Conference (PEMC), Tallinn, Estonia, Sept. 23–25, 2026.
2. G. Orfanoudakis, I. Meramveliotakis, A. Kuperman, R. Mandrioli and E. Pompodakis, "A Family of Hybrid Multilevel Converters with Complementary Arm Operation for DC/AC and AC/AC Conversion," accepted for presentation in the 22nd International Power Electronics and Motion Control Conference (PEMC), Tallinn, Estonia, Sept. 23–25, 2026.
3. V. F. Pires, D. Foito, A. Cordeiro, G. I. Orfanoudakis and J. Monteiro, "A Single-Switch Non-Isolated Boost DC-DC Converter with Minimal Controlled Switches and Enhanced Voltage Gain," accepted for presentation in the 22nd International Power Electronics and Motion Control Conference (PEMC), Tallinn, Estonia, Sept. 23–25, 2026.
4. Y. Ditkovich, A. Levhar, M. Shvartsas, G. Orfanoudakis, E. Pompodakis and A. Kuperman, "Modified Maximum Power Point Reaching for Clamped-Type Passive Magnetic Energy Harvesters," accepted for presentation in the 22nd International Power Electronics and Motion Control Conference (PEMC), Tallinn, Estonia, Sept. 23–25, 2026.
5. A. Levhar, Y. Ditkovich, R. Mandrioli, G. I. Orfanoudakis, M. M. Peretz and A. Kuperman, "Battery-Side Control in Dual-Winding Active Magnetic Energy Harvester Supplying a Constant Power DC Load," 2026 IEEE 8th International Conference and Workshop Óbuda on Electrical and Power Engineering (CANDO-EPE), Budapest, Hungary, 2026, pp. 000347-000352.
6. L. K. Pittala, E. L. Carvalho, M. Ricco, G. I. Orfanoudakis, A. Kuperman and R. Mandrioli, "ZVS Analysis of an Interleaved Current-Fed DAB for Bipolar and Unipolar DC Grids," 2025 IEEE International Conference on Power Electronics, Smart Grid, and Renewable Energy (PESGRE), Dharwad, India, 2025, pp. 1-6.
7. V. F. Pires, A. Cordeiro, D. Foito, G. I. Orfanoudakis and J. Monteiro, "DC-DC Converter with Wider Static Voltage Gain based on Differential Connections," 2025 14th International Conference on Renewable Energy Research and Applications (ICRERA), Vienna, Austria, 2025, pp. 180-185.
8. A. Vulfovich, G. I. Orfanoudakis, M. Mellincovsky, S. N. Banavath, R. Mandrioli and A. Kuperman, "Attaining Arbitrary Load Independent Voltage Gain and Minimizing Inverter VA Rating in S(C)-S(C) Compensated Wireless Power Transfer Links," IECON 2025 – 51st Annual Conference of the IEEE Industrial Electronics Society, Madrid, Spain, 2025, pp. 1-6.
9. E. E. Pompodakis, A. Ahmed and G. I. Orfanoudakis, "Addressing EV-Induced Undervoltage: Implementing Series Compensation to Enhance the Effectiveness of Reactive Power Support," 2025 IEEE Electrical Power and Energy Conference (EPEC), Waterloo, ON, Canada, 2025, pp. 85-89.
10. G. Orfanoudakis, G. Kotoulas, E. Pompodakis, and A. Kuperman, "A simplified modular multilevel step-down DC/DC converter for medium to high-voltage applications," in Proc. 2025 IEEE Seventh International Conference on DC Microgrids (ICDCM), Tallinn, Estonia, Jun. 4–6, 2025.
11. G. Orfanoudakis, E. Pompodakis, and A. Kuperman, "A modified DC-link structure for PWM motor drives to eliminate common-mode leakage and bearing currents," in 2025 IEEE Seventh International Conference on DC Microgrids (ICDCM), Tallinn, Estonia, Jun. 4–6, 2025.
12. A. Levhar, A. Belenky, M. Sitbon, G. Orfanoudakis, R. Mandrioli, and A. Kuperman, "Battery-integrated dual-winding magnetic energy harvester supplying a constant power DC load," in 2025 IEEE Seventh International Conference on DC Microgrids (ICDCM), Tallinn, Estonia, Jun. 4–6, 2025.

13. H. D. Wahyudi, K.-P. Liu, R. Yang, G. Orfanoudakis, R. Wills, A. Cruden, and S. M. Sharkh, "Online battery EIS using cell voltage balancing circuit and PRBS excitation," in Proc. UK and World Energy Storage Conf., Sheffield, U.K., Apr. 14–17, 2025.
14. K.-P. Liu, G. Orfanoudakis, A. Cruden and S. M. Sharkh, "Online Broadband Electrochemical Impedance Spectroscopy within Direct Power Control of a Neutral Point Clamped Inverter," 2024 ESARS-ITEC, Naples, Italy, 2024, pp. 1-6.
15. E. E. Pompodakis, G. I. Orfanoudakis, G. Katsigiannis and E. Karapidakis, "Understanding the Steady-State Impacts of Communication Dysfunctions on the Consensus Secondary Control of Islanded Microgrids," 2024 59th International Universities Power Engineering Conference (UPEC), Cardiff, United Kingdom, 2024, pp. 1-6.
16. A. Paspatis, B. Adebisi, G. Orfanoudakis, K. Siderakis, E. Karapidakis and N. Hatzargyriou, "A DC Link-Based Approach to Realize Zero Feed-in Under Both Static and Dynamic Power System Events," 2024 IEEE CPE-POWERENG, Gdynia, Poland, 2024, pp. 1-6.
17. K.-P. Liu, G. I. Orfanoudakis, S. M. Sharkh and A. Cruden, "Optimised Online Multi-Sine Battery Electrochemical Impedance Spectroscopy using a Three-Phase Neutral Point Clamped Converter," 14th SDEMPED, Chania, Greece, 2023, pp. 606-612.
18. K.-P. Liu, G. I. Orfanoudakis, S. M. Sharkh and A. Cruden, "Online Battery Pack Electrochemical Impedance Spectroscopy Measurement Using a Three-Phase Neutral Point Clamped Converter," 8th ICCEP, Terrasini, Italy, 2023, pp. 63-69.
19. G. I. Orfanoudakis, M. A. Yuratich and S. M. Sharkh, "Current balancing of scalar-controlled induction motors with imbalanced cables," 14th Seminar on Power Electronics and Control (SEPOC), 2022, pp. 1-10.
20. G. I. Orfanoudakis and A. G. Paspatis, "Power Electronics Laboratory Projects Enhance Interdisciplinary Engineering Education," 14th Seminar on Power Electronics and Control (SEPOC), 2022, pp. 1-10.
21. G. I. Orfanoudakis, E. Koutroulis, G. Foteinopoulos and W. Wu, "Evaluation of common-mode leakage current of Aalborg-type transformerless PV inverters," 24th European Conference on Power Electronics and Applications (EPE'22 ECCE Europe), 2022, pp. 1-10.
22. G. I. Orfanoudakis, G. Foteinopoulos, E. Koutroulis and W. Wu, "Design optimization of Aalborg-type transformerless PV inverters with focus on power quality," 2022 11th MOCAS, 2022, pp. 1-5.
23. G. I. Orfanoudakis, E. Koutroulis, G. Foteinopoulos and W. Wu, "Synchronous Reference Frame current control of Aalborg-type PV inverters," 2021 23rd EPE'21 ECCE Europe, 2021, pp. 1-10.
24. G. I. Orfanoudakis, E. Koutroulis, M. A. Yuratich and S. M. Sharkh, "A three-phase transformerless Boost inverter for the reduction of common-mode leakage current in photovoltaic applications," 2021 23rd EPE'21 ECCE Europe, 2021, pp. 1-10.
25. G. I. Orfanoudakis, E. Koutroulis and G. Foteinopoulos, "The role of diodes in the leakage current suppression mechanism of decoupling transformerless PV inverter topologies," 2021 10th MOCAS, 2021, pp. 1-4.
26. G. I. Orfanoudakis, E. Koutroulis, S. M. Sharkh and M. A. Yuratich, "Extended Boost PV inverter topology for the reduction of common-mode leakage current in three-phase applications", 22nd EPE'20 ECCE Europe, Lyon, France, 2020, pp. 1-10.
27. G. I. Orfanoudakis, S. M. Sharkh and M. A. Yuratich, "Positive-sequence flux estimator based on Second-Order Generalized Integrators for grid synchronization and motor control under imbalanced conditions", 21st EPE '19 ECCE Europe, Genova, Italy, 2019, pp. 1–10.
28. G. I. Orfanoudakis, E. Koutroulis, S. M. Sharkh and M. A. Yuratich, "Single-phase transformerless PV inverter topology with ac bypass and mid dc-link voltage clamping", 19th EPE 2017, Warsaw, Poland.
29. D. Papastefanakis, G. Orfanoudakis and K. Siderakis, "Designing the grid protections to accommodate distributed generation", 11th DEMSEE'16, Heraklion, Crete, Greece.

30. V. Kantere, G. Orfanoudakis, A. Kementsietsidis, and T. Sellis, "Query Relaxation across Heterogeneous Data Sources", 24th ACM CIKM '15, 2015, pp. 473-482.
31. G. I. Orfanoudakis, S. M. Sharkh and M. A. Yuratich, "Capacitor size reduction for multiple inverter systems", IET RPG 2011.
32. G. I. Orfanoudakis, S. M. Sharkh and M. A. Yuratich, "Circuit for reducing devices voltage stress due to DC-link capacitor voltage ripple in a Neutral-Point-Clamped inverter", 14th EPE 2011.
33. G. I. Orfanoudakis, S. M. Sharkh and M. A. Yuratich, "Analysis of DC-link capacitor losses in three-level neutral-point-clamped and cascaded H-bridge voltage source inverters", IEEE ISIE 2010, pp. 4-7.
34. G. I. Orfanoudakis, S. M. Sharkh, M. A. Yuratich and M. A. Abu-Sara, "Loss comparison of two- and three-level inverter topologies", 5th IET PEMD 2010.

Citations & Metrics

Database	Citations	h-index	i10-index
Google Scholar	831	12	16

Patents

1. **Jan. 2026:** Patent Application submitted to OBI (Hellenic Industrial Property Organisation). Title: "Hybrid multilevel power converter with arm pairs operating complementarily" (File No: 20260100046).
2. **Apr. 2025:** Submission of a (modified) patent application to the EPO within the eSOLAR project for: "Reconfigurable Electronic DC to AC Power Converter Powered by a Photovoltaic Array" (EP 4447301A1).
3. **Jan. 2024:** Patent granted by OBI within the eSOLAR project framework, titled "Reconfigurable Electronic DC to AC Power Converter Powered by a Photovoltaic Array" (GR 1010619B).
4. **July 2023:** Patent granted for: "Apparatus and methods to control electric motors" (WO 2020/198629 A1).
5. **June 2021:** Patent granted for: "Method and system for controlling downhole pumping systems" – Current control (US 11035209 B2).
6. **Sept. 2019:** Patent granted for: "Method and system for controlling downhole pumping systems" – Backspin control (WO 2019/183407 A1).
7. **Aug. 2019:** Patent application filed for: "Method and system for monitoring the condition of rotating systems" (WO 2019/147750 A2).
8. **Aug. 2018:** Patent granted for: "SOGI-based integrator, PLL and current controller for grid connection and motor control" (WO 2018/157120 A1).

Reviewer Activity

Journal Reviewer for:

- IEEE Transactions on Power Electronics
- IEEE Transactions on Industry Applications

- IEEE Transactions on Industrial Electronics
- IEEE Transactions on Energy Conversion
- IEEE Transactions on Transportation Electrification
- IEEE Journal of Emerging and Selected Topics in Industrial Electronics
- IET Power Electronics
- Elsevier Electric Power Systems Research
- Elsevier e-Prime Advances in Electrical Engineering, Electronics and Energy
- iEnergy
- MDPI World Electric Vehicle Journal

Conference Technical Committee Member / Reviewer:

- IEEE 22nd International Power Electronics and Motion Control Conference (PEMC), Tallinn, Estonia, Sept. 23-25, 2026.
- IEEE International Symposium on Diagnostics for Electric Machines, Power Electronics and Drives (SDEMPED), Chania, Greece, Aug. 28-31, 2023.

Education

Sept. 2008 – Dec. 2012

University of Southampton, UK

PhD in Power Electronics Converters

PhD Thesis: "Analysis and reduction of DC-link capacitor voltage/current stress in three-level PWM converters"

Supervisor: Professor Suleiman Sharkh

Dates: Submission: Dec. 2012; Defense: Feb. 28, 2013; Award date: May 7, 2013.

Sept. 2007 – Sept. 2008

University of Southampton, UK

MSc in Renewable Energy Technologies

Grade: Distinction

MSc Thesis: "Photovoltaic engineering – Analysis of solar radiation for PV applications"

Award date: Jan. 19, 2009.

Oct. 2006 – Feb. 2007

National and Kapodistrian University of Athens

Graduate Program in Logic and Algorithms (MPLA)

Attended courses in Algorithms and Computability.

2000 – 2006

National Technical University of Athens (NTUA)

MEng/Diploma in Electrical and Computer Engineering (5-year Engineering Degree)

Specialization: Computer Science – Control Systems

GPA: 8.36 / 10

Thesis: "Implementation of a query-answering mechanism for peer-to-peer database networks"

Supervisor: Professor Timos Sellis.

Graduation date: May 5, 2007.

2000

Unified Lyceum High School (Heraklion, Crete)

Direction: Science.

GPA: 19.6 / 20

Administrative Experience (HMU)

- **Sept. 2025 – Present:** Regular member of the evaluation committee for the International Open Electronic Tender for a pilot system for thin-film sensors in IoT and Industry 4.0 applications (HISENS project, 2025–present).
- **Sept. 2025 – Present:** Regular member of the evaluation committee for the Open Electronic Tender for annual maintenance of E/M networks and energy infrastructure at HMU (2025–present).
- **June – Nov. 2025:** Regular member of the selection committee for a technical staff position (ETEP) at the ECE Department.
- **2024 – Present:** Academic Counselor for the IEEE Student Branch at HMU.
- **2024 – 2025:** Regular member of the procurement committee for laboratory equipment under the HMU Strategic Research Plan.
- **2024 – 2025:** Regular member of the evaluation committee for Innovation Center support services at HMU.
- **2024 – 2025:** Member of selection committees for the action "Acquisition of Academic Teaching Experience for Young PhD Holders at HMU".
- **2021 – Present:** Regular member of evaluation committees for various research calls managed by the HMU Special Account for Research Funds (ELKE).
- **2020 – 2025:** Regular/alternate member in committees for procurement receipt and service delivery compliance for ELKE HMU and MSc programs.
- **2022:** Participation in the accreditation processes of the undergraduate ECE curriculum at HMU.
- **June 2021:** Regular member of the Central Electoral Committee for electing the Chair and Vice-Chair of the ECE Department.
- **2021:** Contribution to drafting the ECE Department Study Guide.
- **Mar. 2020 – Sept. 2021:** Drafting the Regulations and Writing Guide for Undergraduate Theses at the ECE Department.
- **May 2020 – Feb. 2021:** Member of the evaluation committee for the action "Acquisition of Academic Teaching Experience for Young PhD Holders 2020-2021 at HMU".
- **May – Aug. 2020:** Member of the student credit transfer and recognition committee for the academic year 2019-2020.

Skills

Power Converter Design

Inverter & Converter Topologies: Design of conventional 2-level inverters, as well as NPC, Cascaded H-Bridge, Hybrid/Modular Multilevel Converters, and transformerless PV inverters.

Electrical Component Sizing: Selection of power semiconductors (IGBTs, diodes, thyristors), gate drivers, DC-link capacitors, and LC/LCL output filters.

Cooling Systems: Design and thermal calculation/sizing of cooling systems.

Auxiliary Electronics: Implementation of isolated voltage-current measurements and protective circuits.

Grid Integration, Power Quality & EMC

Synchronization: Application of Phase-Locked Loops (PLL) and Second-Order Generalized Integrators (SOGI) for synchronization with immunity to grid disturbances.

Power Quality & Harmonics: Profiling and suppressing grid-side current harmonic distortion and asymmetry, voltage sags/interruptions, notches, etc.

Leakage Current Suppression: Advanced methods and circuits to reduce common-mode ground leakage currents in PV inverters and motor drives.

EMC Standards Compliance: Analysis, simulation, testing, and formal certification of motor drives according to standard IEC 61800-3.

Advanced Control & Motor Drives

Vector Control Methods: Advanced three-phase AC motor control (induction and permanent magnet synchronous motors) using Field-Oriented Control (FOC).

Extended Boundary Control: Deep expertise in overmodulation, 6-step voltage operation, field weakening, and low-speed/high-torque operation.

Sensorless Drives & Long Cables: Designing observers and algorithms for remote motors across asymmetrical long power cables to mitigate overvoltages, low-speed dropouts, and resonances.

Specialized Motor Control Features: Development of Fault Ride-Through (FRT), flying start, braking/restart methods, and others.

Advanced Startup Routines: Optimized starting over step-up transformer sequences avoiding saturation, with seamless transition from open-loop to closed-loop current control.

Modeling, Simulation & Controller Implementation

Simulation Environments: Expertise in power converter and controller simulations using MATLAB/Simulink.

Rapid Control Prototyping (RCP): Substantial experience with TI C2000 microcontrollers (MCUs) for RCP via Simulink Embedded Coder.

Firmware Development: Experience on fixed-point implementation of embedded C control algorithms.

Controller Validation: Hardware-in-the-Loop (HIL) testing using Typhoon HIL equipment.

EDA, Prototyping & Testing

PCB Design: Creation of electrical schematics and PCB layouts using Electronic Design Automation (EDA) software.

Experimental Validation: Prototype assembly, laboratory troubleshooting, and full-scale factory testing.

High-Efficiency Testing Architectures: Design, simulation, and implementation of experimental setups for back-to-back connection of two high-power motor drives to enable testing with low power consumption.

Global Field Commissioning: Extensive experience with international field testing and diagnostic troubleshooting (UK, France, USA, and elsewhere).

R&D Technical Leadership & IP Protection

Cross-Functional Team Leadership: Proven ability to lead multidisciplinary engineering teams (electronics, software, gateway/FPGA engineers, and technicians) from theoretical concepts to physical implementation and testing.

Mentorship & Supervision: Main supervisor and committee member for multiple PhD candidates, MEng, Master's, and Bachelor's engineering theses.

PRINCE2 Practitioner: Certified framework application for project cost controls, scheduling, risk assessments, and benefit realizations.

Strategic Corporate Management: Ashorne Hill trained in leadership, corporate strategy, accounting, marketing, and resource allocation.

IP Generation: Substantial experience with patent writing (descriptions, figures, claims) and managing the application interaction process with international patent attorneys and examiners.

Certifications & Seminars

- **Project Management:** PRINCE2® Practitioner Certification in Project Management from the Association of Project Managers Group (APMG). A 5-day professional training course covering comprehensive control structures for project cost, scheduling, quality, risk, and benefit realizations.
- **Management:** Management Training Course from Ashorne Hill Management College. A 10-day comprehensive course addressing leadership skills, time management, resource allocation, business finance, accounting, marketing, and corporate strategy.
- **Electrical Safety:** E-learning course on Electrical Safety provided by Praxis42 Training.
- **Defibrillator Use (AED):** Training in the use of an Automated External Defibrillator (AED) certified by St John Ambulance and the Lab of Evidence-Based Healthcare, Education & Clinical Protocols, Department of Nursing, HMU (2026).

Scholarships & Awards

- **2014:** Shortlisted nominee for the UK National "Knowledge Transfer Partnership (KTP) Awards 2014".
- **2008 – 2012:** PhD Research Scholarship awarded by the Engineering and Physical Sciences Research Council (EPSRC), co-funded by TSL Technology Ltd. First-year stipend of £16,240, with annual incremental increases.
- **2007 – 2008:** Lanchester Postgraduate Scholarship awarded by the University of Southampton (£1,000 lump sum).

- **1995 – 1999:** Four awards and distinctions in national competitive mathematics contests organized by the Greek Mathematical Society.

Languages

- **Greek:** Native speaker.
- **English:** Excellent proficiency. Long-term resident in the UK (2007–2014). Holder of the Cambridge Certificate of Proficiency in English (CPE) and Michigan Certificate of Proficiency in English (CPE).
- **French:** Good command. Holder of DELF1 (Units A1, A2, A3, A4) and DELF2 (Units A5, A6) diplomas.

Professional Affiliations

- **IEEE:** Member of the Institute of Electrical and Electronics Engineers (IEEE) including the Power Electronics Society (PELS), Industry Applications Society (IAS), Industrial Electronics Society (IES), and Humanitarian Activities Committee (HAC).
- **TEE:** Licensed Professional Engineer, Member of the Technical Chamber of Greece (TEE) since 2007.

Interests & Community Service

- **Byzantine Music:** Degree in Byzantine Music awarded by the Byzantine Music School of the Holy Archdiocese of Crete (June 2018). Served as Left Cantor at St. Nicholas Greek Orthodox Church, Southampton (Oct. 2007 – Sept. 2014) and at the Church of the Ascension of the Savior, Heraklion (Nov. 2016 – Present).
- **Traditional Music:** Active engagement with traditional folk music and participation in events organized by the Cretan Students' Association (FEK) of Athens (2001–2007).
- **Greek Language Teaching:** Voluntary teaching of the Greek language at the community school of St. Nicholas Greek Orthodox Church, Southampton.