SALVATORE MUSUMECI

Electrical Engineering Degree, University of Catania (1991), PhD in Electrical Engineering VII cycle, at the University of Catania, final exam on 30/10/1995.

Research activity

From 10/1/1991 to 03/31/1992 (6 months). Scholarship for research activities established by the Co.Ri.M.Me. consortium, a consortium between the University of Catania, the Electrical Department, and SGS-Thomson, for Microelectronics Research in Southern Italy. Activity carried out: research activity on the "Definition of driving circuit for isolated gate devices."

From 01/10/2005 to 20/12/2005, from 09/01/2006 to 20/04/2006, 27/01/2007, From 2/10/2006 to 20/12/2006, From 02/01 /2007 to 27/01/2007 (11 months). Contract for occasional research activity funded under the MAP-ICE-MIUR project n. 2024901/1399/R0315: "Optimization of electrical distribution substations and local electricity production systems to support the innovation of the production of Sicilian electromechanical companies for penetration into foreign markets". Local manager Prof. Calogero Cavallaro. University of Catania. Topic: development of a medium voltage circuit-breaker with specifications in line with the ELMEC company partner of the research project.

From 10/1/2007 to 12/1/2007 (2 months). Contract for occasional performance in the research activity funded under the project PRIN 2005 2005099754_002 "Topologies and control of converters for the management of stored energy and supplied by the accumulation systems". Local manager Prof. Calogero Cavallaro. University of Catania. Topic: "Analysis and development of a conversion system suitable for the management and control of the load capacity of storage systems and their interfacing with the DC bus.

From 11/1/2008 to 10/31/2009 Research fellow DIEES Faculty of Engineering, University of Catania. Sector ING-IND/32 "Converters, Electrical Machines and Drives" Topic: "Thermal Models of Power Devices for Switching Converters".

From 01/10/2012 to 02/03/2013 (6 months) Collaboration contract (CO.CO.CO) On European project FPT-ICT-2011_7 SMAC "SMArt system CO-design" Grant Agreement n. 288827, CUP E11J11000420009. Responsible prof. A. Raciti. University of Catania. Research topic: "Development of experimental prototypes for measurements on solid state devices and multi-domain validation".

From 16/07/2019 to 30/09/2019, Fixed-term researcher - pursuant to art. 24 paragraph 3 letter a) of Law 30/12/2010 n. 240 and subsequent amendments. RTDA in 09/E2 Electrical Energy Engineering. ING-IND/32 Converters, Electrical Machines and Drives. Politecnico di Torino, Energy Department (DENERG).

From 01/10/2019 to 30/09/2022. Fixed-term researcher - pursuant to art. 24 paragraph 3 letter b) of Law 30/12/2010 n. 240 and subsequent amendments. RTDB (Tenure Track) in 09/E2 Electrical Energy Engineering. ING-IND/32 Converters, Electrical Machines and Drives. Politecnico di Torino, Department of Energy (DENERG).

From 2019 – 2021 participation in the AVALON project: AViodrive and innovative electric generator. National Research Project. PON tender of the MIUR (Director Decree n. 1735 of 13 July 2017).

May 2021 – to today. Participation in the European Research Project Divertor Tokamak Test (DTT)

From 01-01-2021 to 31-12-2024. Participation in the European Research Project Battery System Concepts for Fully Electric Vessel (SEABAT).

From 12/14/2021 to today. Research unit manager, Innovative solutions for the use of renewable sources in energy communities (ISoREC). National Research Project. PRIN: RESEARCH PROJECTS OF RELEVANT NATIONAL INTEREST – Call 2020, Prot. 202054TZLF.

Consultancy activities and industrial patents

From 01/01/2022 to 15/12/2022 participation in the working group for the contract: Feasibility Study and preliminary design of a Power Boost Unit (PBU).

Patent: Assignee: STMicroelectronics S.r.l. Inventors: G. Belverde, M. Melito, S. Musumeci, R. Pagano, A. Raciti. Patent application Publication: “Protection Circuit for Faulted Power Devices” United States Patent. No.: US 7,173,801 B2 Pub. Date Feb 6, 2007, USA.

From 11/30/1994 to 10/31/1995 (12 months), consultancy contract with Co.Ri.M.Me., a consortium between the University of Catania, Electrical Department, and SGS-Thomson, for Microelectronics Research in the Mezzogiorno, on research activity: "Study of optimal topologies for driving isolated-gate devices susceptible to integration" (11 months).

From 01/07/1996 to 31/12/96 (6 months). Contract for coordinated and continuous industrial research collaboration with SGS-Thomson Microelectronics, Research activity on: ""Realization of a driving circuit for isolated gate devices connected in series with active control on the gate of the collector voltage balancing.

Work attivity in the industrial sector

From 04/15/1997 to 08/31/2001. Applications engineer, research and development (R&D) department of DSG (Discrete & Standard Group), Sito Catania. STMicroelectronics. Typology: Research applied to the application, characterization and modeling of power electronic devices.

Work activity in the field of training

01/11/2009 to 15/07/2018. High school teacher (ITIS) A-40, Electrical and Electronic Sciences and Technologies (ex A034 Electronics). Ministry of Education.

Publishing activity

IEEE member from 2018

Special Issue Editor in Energies MDPI, titled: Advanced DC-DC Power Converters and Switching Converters. to: "A5: Smart Grids and Microgrids". 9 article Open Access + one editorial Open Access. Closed 31 August 2020

Book published as editor: Advanced DC-DC Power Converters and Switching Converters” Ed. Salvatore Musumeci. ISBN 978-3-0365-0446-9 (Hbk); ISBN 978-3-0365-0447-6 (PDF). https://doi.org/10.3390/books978-3-0365-0447-6. Editorial on MDPI titled: Special Issue “Advanced DC-DC Power Converters and Switching Converters,” Author S. Musumeci. Energies 2022, 15(4), 1565; https://doi.org/10.3390/en15041565 - 20 Feb 2022

Special Issue Editor in Energies MDPI, Titled SI: Verifying the Targets—Selected Papers from the 55th International Universities Power Engineering Conference (UPEC 2020), 27 articles Open Access, https://www.mdpi.com/journal/energies/special_issues/UPEC_2020. Chiusura 31 May 2021

Section Board member in Energies

Planning and Operation of Active Distribution Networks pp 1–42 Home Planning and Operation of Active Distribution Networks Chapter “Introduction—Advances and Challenges in Active Distribution Systems” Gianfranco Chicco, Alessandro Ciocia, Pietro Colella, Paolo Di Leo, Andrea Mazza, Salvatore Musumeci, Enrico Pons, Angela Russo & Filippo Spertino DOI https://doi.org/10.1007/978-3-030-90812-6_1 Published 31 January 2022, Publisher Name Springer, Cham Print ISBN 978-3-030-90811-9, First Online: 31 January 2022, Part of the Lecture Notes in Electrical Engineering book series (LNEE,volume 826)

Awards and recognitions

Winner of a scholarship for research activities established by the Co.Ri.M.Me. consortium, a consortium between the University of Catania, the Electrical Department, and SGS-Thomson, for Microelectronics Research in Southern Italy.

Research activity on the "Definition of driving circuit for isolated gate devices." From 10/1/1991 to 03/31/1992 (6 months). Winner of a scholarship for research activities established by the Co.Ri.M.Me. consortium, a consortium between the University of Catania, the Electrical Department, and SGS-Thomson, for Microelectronics Research in Southern Italy.

The article belonging to SI, Verifying the Targets—Selected Papers from the 55th International Universities Power Engineering Conference (UPEC 2020): “Identification of DC Thermal Steady-State Differential Inductance of Ferrite Power Inductors”. Energies 2021, 14, 3854. https://doi.org/10.3390/en14133854 by: Musumeci, S.; Solimene, L.; Ragusa, C.S. was recognized as a “Feature Paper”.

Feature Papers represent state-of-the-art research papers with significant potential for high impact in the field. Feature Papers are indicated on the individual invitation of reviewers or on the recommendation of scientific editors

Scientific activity (last 2 years)

Anno 2023

[1] L. Solimene, D. Cittanti, F. Mandrile, S. Musumeci and R. Bojoi, "Optimal Air Gap Length Design in Powder Core Inductors," in IEEE Transactions on Magnetics, doi: 10.1109/TMAG.2023.3289391.

[2] Barba, V., Musumeci, S., Palma, M., & Bojoi, R. (2023). Maximum Peak Current and Junction-to-ambient Delta-temperature Investigation in GaN FETs Parallel Connection. Power Electronic Devices and Components, 5, 100035. https://doi.org/10.1016/j.pedc.2023.100035.

[3] Musumeci, S., & Barba, V. (2023). Gallium Nitride Power Devices in Power Electronics Applications: State of Art and Perspectives. Energies, 16(9), 3894. https://doi.org/10.3390/en16093894.

[4] Musumeci, S. (2023). Energy Conversion Using Electronic Power Converters: Technologies and Applications. Editorial Energies, 16(8), 3590. https://doi.org/10.3390/en16083590

[5] F. Mandrile, M. Pastorelli, S. Musumeci, I. A. Urkiri and A. Remirez, "Second Life Management From Battery Storage System of Electric Waterborne Transport Applications: Perspectives and Solutions," in IEEE Access, vol. 11, pp. 35122-35139, 2023, doi: 10.1109/ACCESS.2023.3265168.

[6] Griva, G., Musumeci, S., Bojoi, R., Zito, P., Bifaretti, S., & Lampasi, A. (2023). Cascaded multilevel inverter for vertical stabilization and radial control power supplies. Fusion Engineering and Design, 189, 113473. https://doi.org/10.1016/j.fusengdes.2023.113473.

[7] V. Barba, S. Musumeci, M. Palma and R. Bojoi, "Dead Time Reduction Strategy for GaN-Based Low-Voltage Inverter in Motor Drive System," 2023 IEEE Applied Power Electronics Conference and Exposition (APEC), Orlando, FL, USA, 2023, pp. 2385-2390, doi: 10.1109/APEC43580.2023.10131652.

[8] Scrimizzi, F., Cammarata, F., Nicolosi, G., Musumeci, S., & Rizzo, S. A. (2023). The GaN Breakthrough for Sustainable and Cost-Effective Mobility Electrification and Digitalization. Electronics, 12(6), 1436. https://doi.org/10.3390/electronics12061436.

[9] Qureshi, M. A., Torelli, F., Musumeci, S., Reatti, A., Mazza, A., & Chicco, G. (2023). A Novel Adaptive Control Approach for Maximum Power-Point Tracking in Photovoltaic Systems. Energies, 16(6), 2782. https://doi.org/10.3390/en16062782.

[10] Lampasi, A., Pipolo, S., Albanese, R., Ambrosino, R., Bifaretti, S., Bojoi, R., Bonaiuto, V., Castaldo, A., Caldora, M., Cocchi, A., Di Pietrantonio, M., Griva, G., Lopes, C., Manganelli, M., Minucci, S., Musumeci, S., Romano, R., Terlizzi, C., Trotta, A., . . . Zito, P. (2023). Overview of the Divertor Tokamak Test (DTT) coil power supplies. Fusion Engineering and Design, 188, 113442. https://doi.org/10.1016/j.fusengdes.2023.113442.

Anno 2022

[1] S. Musumeci, Fausto Stella, Fabio Mandrile, Eric Armando, and Antonino Fratta. 2022. "Soft-Switching Full-Bridge Topology with AC Distribution Solution in Power Converters' Auxiliary Power Supplies" Electronics 11, no. 6: 884. https://doi.org/10.3390/electronics11060884.

[2] Solimene, L., Corti, F., Musumeci, S., Ragusa, C. S., Reatti, A., & Cardelli, E. (2022). Design and modelling of a controlled saturable inductor for an LCC-S compensated WPT system. Journal of Magnetism and Magnetic Materials, 564, 170056. https://doi.org/10.1016/j.jmmm.2022.170056.

[3] Solimene, L., Ragusa, C. S., & Musumeci, S. (2022). The role of materials in the optimal design of magnetic components for DC–DC converters. Journal of Magnetism and Magnetic Materials, 564, 170038. https://doi.org/10.1016/j.jmmm.2022.170038

[4] S. Musumeci, V. Barba C. Mistretta, F. Scrimizzi. "Advanced Low-Voltage System-in-Package Half-Bridge MOSFET with Added Protection Features," EPE 2022 ECCE Europe, Hannover, Germany, 5 - 9 September 2022.

[5] L. Solimene, F. Corti, S. Musumeci, A. Reatti and C. S. Ragusa, "A controlled variable inductor for an LCC-S compensated Wireless Power Transfer system," IECON 2022 – 48th Annual Conference of the IEEE Industrial Electronics Society, Brussels, Belgium, 2022, pp. 1-6, doi: 10.1109/IECON49645.2022.9968576.

[6] S. Musumeci, V. Barba, F. Mandrile, M. Palma and R. I. Bojoi, "Dead Time Reverse Conduction Investigation in GaN-Based Inverter for Motor Drives," IECON 2022 – 48th Annual Conference of the IEEE Industrial Electronics Society, Brussels, Belgium, 2022, pp. 1-6, doi: 10.1109/IECON49645.2022.9968787.

[7] S. Musumeci, V. Barba and M. Palma, "GaN-Based Low-Voltage Inverter for Electric Scooter Drive System," 2022 AEIT International Annual Conference (AEIT), Rome, Italy, 2022, pp. 1-6, doi: 10.23919/AEIT56783.2022.9951808.

[8] M. A. Qureshi, S. Musumeci, F. Torelli, A. Reatti, A. Mazza and G. Chicco, "Application of a Novel Adaptive Control Approach for the Regulation of Power Converters," *2022 57th International Universities Power Engineering Conference (UPEC)*, Istanbul, Turkey, 2022, pp. 1-6, doi: 10.1109/UPEC55022.2022.9917619.

[9] Chicco, G., Mazza, A., Musumeci, S., Pons, E., & Russo, A. (2022). Editorial for the Special Issue "Verifying the Targets—Selected Papers from the 55th International Universities Power Engineering Conference (UPEC 2020)". Energies, 15(15), 5752. https://doi.org/10.3390/en15155752.

[10] V. Barba, L. Solimene, M. Palma, S. Musumeci, C. S. Ragusa and R. Bojoi, "Modelling and Experimental Validation of GaN Based Power Converter for LED Driver," 2022 IEEE International Conference on Environment and Electrical Engineering and 2022 IEEE Industrial and Commercial Power Systems Europe (EEEIC / I&CPS Europe), Prague, Czech Republic, 2022, pp. 1-6, doi: 10.1109/EEEIC/ICPSEurope54979.2022.9854660.

[11] L. Solimene, F. Corti, S. Musumeci, A. Reatti and C. Ragusa, "Extended ZVS/ZCS operation of Class-E Inverter for Capacitive Wireless Power Transfer," 2022 IEEE International Conference on Environment and Electrical Engineering and 2022 IEEE Industrial and Commercial Power Systems Europe (EEEIC / I&CPS Europe), Prague, Czech Republic, 2022, pp. 1-6, doi: 10.1109/EEEIC/ICPSEurope54979.2022.9854655.

[12] L. Solimene, F. Corti, S. Musumeci, C. S. Ragusa and A. Reatti, "Magnetic Control of LCC-S Compensated Wireless Power Transfer System," 2022 International Symposium on Power Electronics, Electrical Drives, Automation and Motion (SPEEDAM), Sorrento, Italy, 2022, pp. 160-165, doi: 10.1109/SPEEDAM53979.2022.9842241.

[13] G. Griva, S. Musumeci, R. Bojoi, A. Lampasi, P. Zito and S. Bifaretti, "Single-Phase Inverter Evaluation for a Tokamak Non-Axisymmetric In-Vessel Coil Power Supply," 2022 IEEE 21st Mediterranean Electrotechnical Conference (MELECON), Palermo, Italy, 2022, pp. 506-511, doi: 10.1109/MELECON53508.2022.9843120.

[14] M. Palma, S. Musumeci, F. Mandrile and V. Barba, "Experimental Evaluation of Dead Time Reverse Conduction Losses in Motor Drives Applications," PCIM Europe 2022; International Exhibition and Conference for Power Electronics, Intelligent Motion, Renewable Energy and Energy Management, Nuremberg, Germany, 2022, pp. 1-6, doi: 10.30420/565822072.

Teaching activity

Anno 2023

Lecturer of the teaching course

Azionamenti elettrici ed elettronica di potenza, 01NIVNE (Corso Di Laurea Magistrale In Ingegneria Meccanica – Politecnico di Torino).

Fondamenti di elettronica di potenza 01SUULX (Corso Di Laurea In Ingegneria Elettrica – Politecnico di Torino)

Dispositivi elettronici di potenza nella conversione di energia 01GMJRV, (Dottorato Di Ricerca In Ingegneria Elettrica, Elettronica E Delle Comunicazioni – Politecnico di Torino)

Collaborations for the teaching course

Progettazione meccanica e trazione elettrica di veicoli su rotaia. Prof. Bosso Nicola (AA-ZZ) 01VJHNE, (Corso Di Laurea Magistrale In Ingegneria Meccanica - Politecnico di Torino)

Electrified propulsion solutions and energy storage systems (AA-ZZ) 02UKXUG (Master Univ. Di Ii Livello In Digitalization And Autonomous Commercial Vehicles For A Carbon-Free Logistics - Politecnico di Torino).

Challenge@PoliTo by Firms - Enel Grids. Prof. Canova Aldo (AA-ZZ) 01GCHOQ, 01GCHND, 01GCHPX

Anno 2022

Lecturer of the teaching course

Azionamenti elettrici ed elettronica di potenza, 01NIVNE (Corso Di Laurea Magistrale In Ingegneria Meccanica - Politecnico di Torino)

Collaborations for the teaching course

Progettazione meccanica e trazione elettrica di veicoli su rotaia. Prof. Bosso Nicola (AA-ZZ) 01VJHNE (Corso Di Laurea Magistrale In Ingegneria Meccanica - Politecnico di Torino).

Electrical drives for eMobility - Prof. Armando Eric Giacomo (AA-ZZ) 01TVTQW (Mechatronic Engineering (Ingegneria Meccatronica) - Torino)

Institutional assignments

Secretary of the College of Electrical Engineering, Member of the quality commission of the College of Electrical Engineering.