

2022 Second International Conference on Sustainable Mobility Applications, Renewables and Technology (SMART 2022)

**Cassino, Italy
23 – 25 November 2022**



**IEEE Catalog Number: CFP22D21-POD
ISBN: 978-1-6654-7147-3**

**Copyright © 2022 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP22D21-POD
ISBN (Print-On-Demand):	978-1-6654-7147-3
ISBN (Online):	978-1-6654-7146-6

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

Energy Management of Autonomous Electric Vehicles by Reinforcement Learning Techniques	1
<i>Monica Alonso, Hortensia Amaris, David Martin, Arturo De La Escalera</i>	
On the Efficiency of LFP Lithium-Ion Batteries	8
<i>Eduardo Redondo-Iglesias, Serge Pelissier</i>	
Experience-Based Course on Three-Phase Electrical Power Conversion	13
<i>Giacomo Galli, Gilles Perusot, Matthieu Berranger, Noemi Lanciotti</i>	
Comparative Study of Single-Switch and Double-Switch Converter Topologies, Working on Dead-Zone Mode, for Fuel Cell Applications	22
<i>Pedro Andrade, Fernando Bento, Adérito Neto Alcaso, Antonio J. Marques Cardoso</i>	
An Optimized Design of T-Compensation Network for Wireless Power Transfer System with Full-Bridge Active Rectifier.....	28
<i>Siyuan Lu, Mike Böttigheimer, Nejila Parspour</i>	
Model-Based Investigation and Evaluation of a Hydrogen Expansion Engine by Determining System Efficiency as Well as Market Development for Heavy-Duty Hydrogen Vehicles.....	36
<i>Nicolas Muck, Steffen Wieser, Özcan Deniz, Marcel Scharmach</i>	
Design and Validation of a Dynamic Inductive Power Transfer System for EV Battery Charging	43
<i>Alessandro Busacca, Antonino Oscar Di Tommaso, Nicola Campagna, Rosario Miceli, Vincenzo Castiglia, Stanimir Valtchev</i>	
A Streamlined Start-Up Procedure for Grid-Connected Photovoltaic System with DC Power Optimizers	48
<i>Trung-Hieu Uong, Leonardo Callegaro</i>	
Hydraulics Decentralization on a Mobile Crane.....	54
<i>Matteo Beligoj, Marco Zava, Luigi Alberti, Alessandro Termini</i>	
Optimal Charging of Electric Vehicle Fleets: Minimizing Battery Degradation and Grid Congestion Using Battery Storage Systems	63
<i>David Geerts, Róbinson Medina, Wilfried Van Sark, Steven Wilkins</i>	
Optimal Sizing and Placement of Droop-Based Converters in DC Microgrids with ZIP Loads.....	74
<i>Spyridon Chapaloglou, Babak Abdolmaleki, Elisabetta Tedeschi</i>	
Wind Turbine Cost Reduction: A Detailed LCOE-Surface Model of a Wind System.....	82
<i>Khadija El Kinani, Sandrine Le Ballois, Lionel Vido</i>	
Fast Evaluation of the Transient Voltage Stability of Highly Reliable Automotive Power Supply Systems.....	89
<i>Michael Gerten, Anika Henke, Stephan Frei</i>	
Analyzing Critical Resonances Within Automotive Power Supply Systems Affecting the Transient Voltage Stability	96
<i>Michael Gerten, Stephan Frei</i>	
Design Features and Benefits of Advanced Multiphase Inverter-Fed Electric Drives	102
<i>Jörg Kammermann, Igor Bolvashenkov, Hans-Georg Herzog, Andrey V. Brazhnikov</i>	

Potential Environmental Impact of Introduction of Electric Vehicles in Private and Public Fleets: A Case Study in Cassino	109
<i>Mauro D'Apuzzo, Azzurra Evangelisti, Alessandro Silvestri, Giuseppe Cappelli, Vittorio Nicolosi</i>	
Smart Urban Mobility Management Project: A Concrete Step Towards More Sustainable and Connected Communities	116
<i>Mauro D'Apuzzo, Giuseppe Cappelli, Stefano Buzzi, Vittorio Nicolosi</i>	
An Introductory Step to Develop Distance Decay Functions in the Italian Context to Assess the Modal Split to E-Bike and E-Scooter	124
<i>Mauro D'Apuzzo, Azzurra Evangelisti, Giuseppe Cappelli, Vittorio Nicolosi</i>	
Wave Loading of a Half Ellipsis Array Type Offshore Structure Supporting a Wind Turbine.....	132
<i>Thomas P. Mazarakos</i>	
New Exterior Design Options for Improving the Efficiency of Fully Autonomous Heavy Duty Vehicles	139
<i>Robert Hahn</i>	
Calculation of Roughness Effects in Cooling Channels for Thermal Conduction of an Air Cooled Electrical Excited Synchronous Machine	144
<i>Hagen Spielmann, Joffre Nasr</i>	
Electromagnetic Compatibility Evaluation of Wireless Charging Systems for Public Spaces.....	151
<i>A. David, M. Tiemann, B. Schmuelling, N. Haussmann, S. Stroka, M. Clemens</i>	
An Open IoT Platform: Lessons Learned from a District Energy System	157
<i>Thomas Schranz, Qamar Alfalouji, Thomas Hirsch, Gerald Schweiger</i>	
Evaluation of Different Francis Turbine Modelling Techniques for Real Time Digital Simulator Applications.....	166
<i>Hasan Akbari, Robert Schürhuber, Juan I. Pérez-Díaz, José-Ignacio Sarasúa</i>	
Evaluation of Different Waterway Modelling Techniques for Real Time Digital Simulator Applications.....	172
<i>Hasan Akbari, Robert Schürhuber, Juan I. Pérez-Díaz, José-Ignacio Sarasúa</i>	
Development and Testing of a Zero Emission Drive Unit for Battery Electric Vehicles	178
<i>Steffen Wieser, Sven Reiland, Linda Bondorf, Manuel Löber, Tobias Schripp, Franz Philipps</i>	
Enhanced Modulation Strategy for 7-Level Voltage Waveform in Asymmetrical 5-Level Cascaded H-Bridge Inverters.....	184
<i>A. O. Di Tommaso, R. Miceli, C. Nevoloso, G. Scaglione, G. Schettino, F. Viola, C. Buccella, C. Cecati, G. Cimatoroni</i>	
Energy Consumption Comparison of Current Powertrain Options in Autonomous Heavy Duty Vehicles (HDV).....	191
<i>Sebastian Sigle, Robert Hahn</i>	
A New Test System for the Simulation-Based Emulation of Highly Dynamic Power Supply Faults.....	198
<i>Marvin Rübarsch, Stephan Frei</i>	
Development of Reference Current Calculation Scheme for Grid-Side Converter During Unbalanced Faults	203
<i>Muhammad Abubakar, Hasan Akbari, Herwig Renner</i>	

Highly Compact Partial Power Converter for a Highly Efficient PV-BESS Stacked Generation System	212
<i>Pierpaolo Granello, Luigi Schirone, Pavol Bauer, Rosario Miceli, Filippo Pellitteri</i>	
Design and Simulation of a Grid-Connected Two-Stage Bidirectional Converter for a Combined PV-Stationary Energy Storage System.....	218
<i>M. Mahamudul Hasan, Shahid Jaman, Thomas Geury, Omar Hegazy</i>	
Torque Enhancement of Surface-Mounted Permanent Magnet Synchronous Machines Via Axial Assisted Magnets.....	226
<i>Jinya Chen, Kan Liu, Shichao Zhou, Huaqiang Cai, Yongdan Chen, Chao Huang, Dinghua Zhang</i>	
Analytical Based Design of FSPMMs: A Comparison Between Surface-Mounted PMs and Consequent-Pole Topologies	234
<i>Hajer Jmal, Amal Souissi, Imen Abdennadher</i>	
Control Strategy for the Maximum Power Extraction of a Wave Attenuator.....	241
<i>Mauro Andriollo, Emanuele Lax, Andrea Tortella, Luca Martinelli</i>	
Low-Cost Structural Health Monitoring System for Smart Buildings	251
<i>Andrea Toscani, Nicholas Rocchi, Daniel Pinardi, Marco Binelli, Leonardo Saccenti, Angelo Farina, Stefano Pavoni, Marcello Vanali</i>	
Networked Control of Distributed Energy Systems in Dispatchable Microgrids: System Modeling and Stability Considerations.....	258
<i>Augusto Matheus Dos Santos Alonso, João Bosco Ribeiro Do Val</i>	
Voltage Regulation in Distribution Networks in the Presence of Distributed Generation: LVR and E-OLTC with a Machine Learning Approach	267
<i>Alessandro Bosisio, Alberto Berizzi, Durim Musiqi</i>	
A Feasibility Study of Using Renewable-Based Hydrogen in Off-Grid Domestic Energy Systems: A Case Study in Italy.....	274
<i>Alessandro Bosisio, Andrea Morotti, Stefano Penati, Alberto Berizzi, Caterina Pasetti, Gaetano Iannarelli</i>	
Analysis of the Wind Energy Supply and Integration in South Africa.....	281
<i>Stefan Karamanski, Gareth Erfort</i>	
High-Power SiC Module in Wind Turbine Full Scale Frequency Converter: Efficiency Comparison with IGBT-Based Converter.....	289
<i>Jelena Loncarski, Hussain A. Hussain, Alberto Bellini</i>	
Literature Review on Wireless Charging Technologies: Future Trend for Electric Vehicle?	296
<i>Cristian Giovanni Colombo, Seyed Mahdi Miraftebzadeh, Alessandro Saldarini, Michela Longo, Morris Brenna, Wahiba Yaici</i>	
Comparative Study Among Different Rotor Topologies of Axial Flux Permanent Magnet Machines	301
<i>Salman Ali, Guido Rubino, Luca Ciprini, Rafat Ali, Fabrizio Marignetti</i>	
Speed Sensorless Control Based on Luenberger Observer for DC Motors	307
<i>Guido Rubino, Giovanni Tomassi, Luca Ciprini, Salman Ali, Fabrizio Marignetti</i>	
Design of a PM Vernier Machine with Concentrated Winding Aimed at a Direct Drive in Wheel Operating for Electric Bus.....	313
<i>Walid Guendouz, Abdelmounaim Tounzi, Toufik Rekioua</i>	

Integrated Boost-Converter for 400 V - 800 V Fast-Charging Compatibility	320
<i>Gabriele Rizzoli, Michele Mengoni, Luca Vancini, Giacomo Sala, Angelo Tani, Luca Zarri</i>	
Requirements Determination and Variant Configuration of Multivariable Drive Concepts	328
<i>Julian Franzen, Jannis Sinnemann, Udo Pinders</i>	
High Frequency Flux Modulation for Electric Machines	335
<i>Ravi Raju, Jesse Leonard</i>	
Influence of Magnet Tolerances and Rotor Eccentricities on Cogging Torque of 12-Slot/10-Pole PM Machines.....	338
<i>D. Xiang, Z. Q. Zhu, Y. H. Wu, F. Xu, Y. F. Cheng</i>	
Optimization of Torque Performance of FSPM Machines by Rotor Pole Shaping Using FEA and Genetic Algorithm.....	353
<i>Emrah Cetin, Zi Qiang Zhu</i>	
Effect of Armature Reaction on Asymmetric PM Loss and Temperature Distributions in V-Shape Interior Permanent Magnet Synchronous Machines.....	361
<i>Yinzhao Zheng, Dawei Liang, Zi Qiang Zhu, Hailong Liu, Yanjian Zhou</i>	
Improved Pulsating Signal Injection Based Sensorless Control of Dual Three Phase IPMSMs Considering Inductance Asymmetry	371
<i>Yang Chen, Ximeng Wu, Zi-Qiang Zhu, Chaohui Liu</i>	
A Novel DC-Link Voltage Observer with Time Delay Compensation for Small DC-Link Capacitor-Based IPMSM with EEMF Based Sensorless Control	377
<i>Jun Yan, Ximeng Wu, Zi-Qiang Zhu, Chaohui Liu</i>	
Experimental Examination of the Heat Transfer in a High Power Eddy Current Brake with a Magneto-Isotropic Material Structure	383
<i>Christoph Köhler, Christoph Holtmann, Frank Rinderknecht, Lukas Arens</i>	
Analytical Investigation of Flux Switching PM Machines: Air Gap Flux Density Formulation.....	390
<i>Anis Abdelkefi, Amal Souissi, Imen Abdhennader</i>	
Smart Buildings Energy Management Strategy Based on Consumer Budget: Experimental Implementation Perspective	397
<i>Khaled Khezzane, Mamadou Lamine Doumbia, Farid Khoucha</i>	
Robust Operation and Control of Smart Distribution Grid Under Cyber Threats	404
<i>V. C. Jishnu Sankar, R. Sriharan, Manjula G. Nair, Carlos Alvarez Bel</i>	
Control of an Ultrafast Electric Vehicle Charger Based on a Series-Parallel Modular Multilevel Converter.....	414
<i>Cristóbal Rodríguez, Claudio Vidal, Ricardo Barros, Matías Díaz, Saravanakumar Rajendran</i>	
Control of an Isolated AC-DC Matrix Converter for Vehicle-to-Grid Applications.....	420
<i>Claudio Vidal, Cristóbal Rodríguez, Kevin Ríos, Saravanakumar Rajendran, Matías Díaz</i>	
Control of a Shunt-Series Modular Multilevel Converter for Low-Frequency AC Transmission Systems.....	426
<i>Patricio Pizarro, Saravanakumar Rajendran, Anastasia Grolleau, Matías Díaz</i>	
Resilience and Sustainability Function Deployment for SMART Companies	435
<i>Mauro D'Apuzzo, Alessandro Silvestri</i>	

Reliability Analysis and Allocation for Electric and Hybrid Vehicles	442
<i>Alessandro Silvestri, Domenico Falcone, Fabrizio Marignetti, Luca Ciprini</i>	
An Aid for Introducing Transverse Flux PM Machines to MS Students: BLI Law-Based Assessment of the Torque Production	450
<i>Ahmed Masmoudi</i>	
Performance Analysis of PM Assisted Synchronous Reluctance Motor with Optimized Novel Design for Electric Vehicular Application	456
<i>Jitendra G. Jamnani, Swapnil Jani</i>	
Electric Vehicle Candidature Based on Electromagnetic Evaluation of the Double-Stator Wound- Field Flux Switching Machine	461
<i>Hillary C. Idoko, Udochukwu B. Akuru, Wasiq Ullah, Faisal Khan, Olawale Popoola, Lilian L. Amuhaya</i>	
Design of Controlled Charging Strategy for Parallel Operation of Multiple Modular Lithium-Ion Battery Packs	465
<i>Biplov Jha, Apsara Adhikari, Ram Prasad Pandey</i>	
A Six-Phase Interleaved Buck-Boost Converter Using Adaptive Delta Modulation Control Loop for Renewable Energy Applications	473
<i>Farag S. Alargt, Ahmed S. Ashur, Ahmad H. Kharaz</i>	
Multiphase Interleaved SEPIC Converter Using ADM Control Loop Suitable for Hybrid Energy Source Integration	481
<i>Farag S. Alargt, Ahmed S. Ashur, Ahmad H. Kharaz</i>	
Analysis of the Thermal Limits of Conventional Eddy Current Brakes Based on a Thermal 1d- Model	489
<i>Christoph Holtmann, Frank Rinderknecht, Andreas Möckel</i>	

Author Index