

2022 4th Global Power, Energy and Communication Conference (GPECOM 2022)

**Cappadocia, Turkey
14-17 June 2022**



**IEEE Catalog Number: CFP22R15-POD
ISBN: 978-1-6654-6926-5**

**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:	CFP22R15-POD
ISBN (Print-On-Demand):	978-1-6654-6926-5
ISBN (Online):	978-1-6654-6925-8

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

TTI - POWER ELECTRONICS, DEVICES AND CONTROLLERS

Design and implementation of new battery monitoring system for photovoltaic application, <i>Asseel Noori Talib, Kamran Hafeez, Mohannad Jabbar Mnati, Shahid A.Khan</i>	1
Novel re-configurable topologies of SLC based high gain DC-DC converters, <i>Atif Iqbal, Md Samiullah, Imtiaz Ashraf, M.A. Alhitmi, Ersan Kabalci</i>	8
A critical review on state-of-charge balancing methods in multilevel converter based battery storage systems, <i>Fatih Eroglu, Ahmet Mete Vural</i>	14
State-of-charge balancing control in grid-connected single-phase cascaded H-bridge multilevel converter based battery storage systems, <i>Fatih Eroglu, Mehmet Kurtoglu, Ahmet Eren, Ahmet Mete Vural</i>	20
Improved performance for the DC-AC converters control system based on PCH controller and reinforcement learning agent, <i>Marcel Nicola, Claudiu I Nicola</i>	26
Suppression of circulating current in islanded DC microgrid using a decentralized adaptive line resistance approach with secondary leaky integration control, <i>Polycarp Odo</i>	32
Assessment of different small-value current sensor devices for current control applications, <i>Viviana Basurto-Rios, Kevin Cano-Pulido, Ismael Araujo-Vargas, Nancy Mondragon-Escamilla</i>	37
Controller design and stability analysis of electric spring with switchable smart load, <i>Yubin Duan, Yi Wei, Xiaohu Wang, Xinyuan Chen, Chaohui Zhao</i>	43
MRAS based model predictive torque control of induction motor drive for electric vehicles, <i>Aydin Boyar, Ersan Kabalci, Yasin Kabalci</i>	51
Comparison between control methods for a multi-input converter, <i>Pedro Henrique de Paula, Marcio Luiz Magri Kimpara, João Onofre Pereira Pinto</i>	57
Comparative study of SiC MOSFET and JFET using an active gate driver, <i>Arijit Sengupta, Mohammed Agamy</i>	63
Experimental impact analysis of the refrigerator cable distributions on conducted electromagnetic emission, <i>Arda Maro, Gokturk Poyrazoglu</i>	69

Experimental impact analysis of the refrigerator cable design on disturbance power test <i>Firat Araz, Gokturk Poyrazoglu</i>	78
DC charging architecture enabled power transfer using vehicle-to-grid technology, <i>M. D'costa, Bhakti W., R. Pathak, Siddhesh P., A. Sheikh</i>	84
Design and simulation of an inductor based active cell balancing circuit for lithium-ion batteries, <i>Aditya P Panchal, Kedar Bhatt, Sagar Gitaye, Manasvi Bhand, Mohd Adil Sheikh</i>	89
Comparison of MPPT techniques on THD current in a grid-connected photovoltaic system, <i>Ricsa Alhassane Soumana, Michael Juma Saulo, Christopher Maina Muriithi</i>	95
Implementation of a PCM control scheme in a multiport Boost converter for BMS applications, <i>V. Basurto-Rios, K. Cano-Pulido, I. Araujo-Vargas, N. Mondragón-Escamilla, P. Velazquez-Elizondo, M. García-Romero</i>	101
A new dv/dt filter design method using the voltage reflection theory, <i>Bernard Arhin, Hanju Cha</i>	107
Evaluation of internal resistance methods for tracking battery state of health, <i>Yunus Koc, Ugur Emre Dogru, Rahmet Aybüke Bilir</i>	112
Design of hybrid energy system of CRH2 train passing through neutral section, <i>Muhammad Talha Ikram, Li Huawei, Qadeer Abdul, Hussain Arif</i>	117
Concept of a scalable communication system for industrial wireless power transfer modules, <i>Sascha Kurz, Javier Stillig, Nejila Parspour</i>	124
An improvement on modified voltage lift switching inductor structures used in X-Y converters to eliminate impulsive turn-on currents, <i>Celal Kavlak, Bunyamin Tamyurek</i>	130
Conducted emissions analysis of DC-DC Buck converter, <i>Secil Genc, Burcu Mantar Gundogdu, Okan Ozgonenel</i>	135
Safety test setup installation for E-bike battery systems, <i>Mert Savrum, Gokturk Poyrazoglu</i>	139
A behavior electrical model of the MOSFET using Matlab/Simulink, <i>Mohamed Baghdadi, Elmostafa Elwarraki, Imane Ait Ayad</i>	145
Capacitor voltage control of PV based quasi-z-source inverter, <i>Arvind Yadav, Mohit Bajaj, Francisco Jurado, Salah Kamel</i>	150
Resonance tuning in wireless energy transfer system, <i>Elena N. Baikova, Alexandre V. Baikov, Luís Romba, Stanimir Valtchev, Rui Melicio</i>	156

TT2 - ELECTRIC MACHINES AND DRIVES

Contributions to discrete-time sliding mode observers for permanent magnet synchronous motor drive systems, <i>Tiago Davi Curi Busarello</i>	162
Comprehensive design approach for field-oriented control of interior permanent magnet synchronous machines, <i>Tiago Davi Curi Busarello, Abdullah Bubshait, Oruganti V.S.R. Varapasad, Abdulhakeem Alsaleem, Marcelo G. Simões</i>	168
Electrification of a local public transportation system: a case study, <i>Nicola Campagna, Vincenzo Castiglia, Rosario Miceli, Gioacchino Scaglione</i>	174
Real time implementation of the PMSM sensorless control based on FOC strategy, <i>Claudiu-Ionel Nicola, Marcel Nicola</i>	179
Effect of the stator slot indents on fluid damping loss in submersible pump applications, <i>Didem Tekgiin, Muhammed Muhsin Cosdu, Burak Tekgun, Irfan Alan</i>	184
Investigation of the effect of the temperature and magnetization pattern on flux density, instantaneous torque, unbalanced magnetic forces of a surface inset PMM, <i>Ahmed Abbas, Atif Iqbal, A Hosseinpour, Mohammad Shahabuddin, Ersan Kabalci</i>	190
Optimization of cogging torque of hybrid excitation motor based on genetic algorithm and TOPSIS method, <i>Liang Pang, Qingliang Yang, Chaohui Zhao, Wendong Zhang, Haihong Qin</i>	196
Decision model and application of electric vehicle charger installation to distribution transformers, <i>Huseyin Tufan Gungor, Gokturk Poyrazoglu</i>	202
Dead-time analysis in three-phase two-level inverters using the SVPWM technique, <i>Kadir Akgul, Ali Fuat Ergenc, Murat Yilmaz, Lale T. Ergene</i>	210
Modelling and simulation of bifurcated winding induction generator using 3DEXPERIENCE, <i>Manoj Kumar S, Deepak Sagar B S, Prema V, Anil Chandra A.R, Suhas B.G</i>	216
Optimal BLDC motor control using a WOA-based LQR strategy, <i>Sumit Sharma, Naveen K. Sharma, Mohit Bajaj, Vineet Kumar, Francisco Jurado, Salah Kamel</i>	222
High-fidelity electric vehicle energy consumption modelling and investigation of factors in driving on energy consumption, <i>İlhan Kocaarslan, Mustafa Alparslan Zehir, Ege Uzun, Enes Can Uzun, Mustafa Emin Korkmaz, Yiğit Çakıroğlu</i>	227
Digital twin architecture for mining industry: case study of a stacker machine in an experimental open-pit mine, <i>Nabil Elbazi, Mustapha Mabrouki, Ahmed Chebak, FatimaEzzahrae Hammouch</i>	232

Electric drive control systems with neural network technologies, <i>Alexey Sinyukov, Tatiana Sinyukova, Elena Gracheva, Stanimir Valtchev, Viktor Meshcheryakov</i>	238
TT3 - CONVENTIONAL AND RENEWABLE ENERGY TECHNOLOGIES	
Delay margin computation of generator excitation control system with incommensurate time delays using critical eigenvalue tracing method, <i>Ömer Aydın, Şahin Sönmez, Saffet Ayasun</i>	244
Impact of virtual inertia on stability delay margins of micro grids with communication time delay, <i>Suud Ademnur Hasen, Şahin Sönmez, Saffet Ayasun</i>	250
Energy management between zones of smart multi-microgrid system with renewable generation to increase grid resilience, <i>Berk Dirmilli, Onur Hakkı Eyüboğlu, Ömer Gül</i>	256
Energy efficiency for laboratory building: a case study, <i>Ismail El Kafazi, Rachid Bannari, Chaymae Boubii, Brahim ElBhiri</i>	262
Effects of transmission operations on distribution networks with DER penetration: a case study, <i>Keaton A Wheeler, Michael Simone, Peter Zhou</i>	267
Effective grounding criteria for high penetration inverter based resources in distribution networks, <i>Keaton A Wheeler, Michael Simone, Alexandre Nassif, Yuji Takenobu, Tom Key, Wei Ren</i>	272
A microgrid case study: steps and considerations for implementation, <i>Keaton A Wheeler, Harun Buyukkocabas, Michael Simone, Tianyu Ding, Brent Smith, Neil Cumming</i>	278
A protection and operating scheme integrated into a grid-edge microgrid, <i>Keaton A Wheeler, Harun Buyukkocabas, Michael Simone, Jia Guo, Elizabeth Lee, Bryan Winger</i>	284
Comparative analysis of improved grid forming control design methods for islanded grid with static and rotating energy sources, <i>Atul Pandey, Pratim Kundu</i>	290
Rotor angle stability analysis by using Lyapunov's direct method of a SMIB power system, <i>Cenk Andic, Ali Ozturk, Belgin Turkay</i>	296
Extraction of electrical parameters for two-diode photovoltaic model using combined analytical and genetic algorithm, <i>Abdessamad Boussafa, Mohammed Ferfra, Yahia El Ouazzani, Reda Rabeh, Khalid Chennoufi</i>	301

Honey badger algorithm based tuning of PID controller for load frequency control in two-area power system including electric vehicle battery, <i>Cenk Andic, Sercan Ozumcan, Ali Ozturk, Belgin Turkey</i>	307
The impact of the EV aggregator on the stability regions of the time-delayed LFC-EV with FOPI controller, <i>Alperen Sari, Sahin Sonmez, Saffet Ayasun, Yasin Kabalci</i>	311
Implementing renewable energy technologies in the city of Jeddah, <i>Montaser Shaban Kabakibou, Chris Chatwin</i>	316
Frequency stability enhancement of hybrid multi-area power grid considering high renewable energy penetration using TID controller, <i>Ahmed H.A. Elkasem, Salah Kamel, Mohamed Khamies, Ersan Kabalci, Hossein Shahinzadeh</i>	322
Evaluation of static network equivalent models for N-1 line contingency analysis, <i>Miguel Ramirez-Gonzalez, Martina Bossio, Felix R. Segundo Sevilla, Petr Korba</i>	328
Extending the energy storage lifetime: a hybrid power-sharing method, <i>Budyanto Jo Salli, Hafiz Ahmed</i>	334
Propitious step for CO ₂ mitigation in university campus boosting clean development mechanism, <i>Subhash Chandra, Arvind Yadav, Mohit Bajaj, Naveen Kumar Sharma, Francisco Jurado, Salah Kamel</i>	340
Optimal sizing and cost assessment of off grid connected hybrid microgrid system, <i>Sumit Sharma, Yog Raj Sood, Vineet Kumar, Naveen Kumar Sharma, Mohit Bajaj, Francisco Jurado, Salah Kamel</i>	344
Load frequency control of multi-area power system with integration of SMES and plug-in electric vehicles, <i>CH Naga Sai Kalyan, Mohit Bajaj, Salah Kamel, Francisco Jurado</i>	349
Power system inertia estimation using a residual neural network based approach, <i>Miguel Ramirez-Gonzalez, Felix Rafael Segundo Sevilla, Petr Korba</i>	355
The voltage regulation role of smart inverters in rural distribution systems: testing framework, <i>Fathalla Eldali, Robert Harris, David Pinney, Venkat Banunarayanan, Jean Carlos Hernandez-Mejia, Joshua Perkel, Nigel Hampton</i>	361
PMU-based state estimator for power systems including VSC-HVDC links, <i>Georgios Karvelis, George Korres</i>	366
Active disturbance rejection control of nuclear pressurized water reactor for power generation, <i>Saif Ahmad, Kamal K Abdulraheem, Andrei Olegovich Tolokonsky, Hafiz Ahmed</i>	372
An estimation algorithm for distributed hierarchical control used in microgrids, <i>Ayberk Calpbincici, Ersan Kabalci, Erdal Irmak</i>	378

Data driven approach for long term forecasting of renewable energy generation, <i>Shubham S Gugaliya, Durgesh Deshmukh, Sunny Kumar, Mohd Adil Sheikh</i>	383
Development of a vehicle-to-grid (V2G) energy management system to mitigate local operational challenges in low voltage distribution networks with photovoltaics, <i>Furkan Gunes, Mustafa Alparslan Zehir</i>	389
MPPT comparison of standalone photovoltaic system using multi-level boost converter <i>Imane Ait Ayad, Elmostafa Elwarraki, Mohamed Baghdadi</i>	395
A New Bus Reduction Approach based on Extended REI Model, <i>Merden Yesil, Erdal Irmak</i>	400
Modelling and analysis of delta-connected power transformers grounded using zig-zag transformer, <i>Negar Dashti, Celal Gokce, Ziya Basagac, Habip Oner, Umut Yener, Berrin Susluoglu, Gokhan Onal, Can Gurkan, Oguzhan Ozcelik</i>	406
TT4 - SMART GRID RESEARCHES AND APPLICATIONS	
Artificial intelligence (AI)-based identification of appliances in households through NILM, <i>ASM Ashraf Mahmud</i>	414
Masked symmetric key encrypted verification codes for secure authentication in smart grid networks, <i>Vincent Omollo Nyangaresi</i>	427
Smart prospects for solar-based cooling and heating systems in the Middle East and Turkey, <i>Abdullatif Baba, Shadi Al Shehabi, M. Talal Bonny</i>	433
The system of automatic adaptive change of relay protection operation parameters in distribution networks, <i>Danilov S.A., Voloshin A.A., Voloshin E.A., Kovalenko A.L., Degtiarev D.A., Sazanov V.S.</i>	439
Algorithm for generating the equivalent power system according to PMU, <i>Degtiarev D.A., Danilov S.A., Kovalenko A.L., Voloshin A.A., Voloshin E.A.</i>	444
Vulnerability assessment framework for a smart grid, <i>Muhammad Rashed, Joarder Kamruzzaman, Iqbal Gondal, Syed Islam</i>	449
Artificial neural network based cost estimation of power losses in electricity distribution system, <i>Gokhan Goren, Burak Dindar, Omer Gul</i>	455
Demand response planning for day-ahead energy management of CHP-equipped consumers, <i>Mahshid Javidsharifi, Hamoun Pourroshanfekr Arabani, Tamas Kerekes, Dezso Sera, Josep M. Guerrero</i>	461

Non-Pilot protection of the inverter-dominated microgrid using artificial neural networks, <i>Sina Driss, Firouz Badrkhani Ajaei</i>	468
Optimum energy management in electric vehicle parking lots using heuristic methods, <i>Bilal Canol, Cenk Andic, Mikail Purlu, Belgin Emre Turkey</i>	473
Centralised Fuzzy control asset congestion management in distribution networks, <i>Hussein Mohammed Badr, Ramzy Salim Ali, Jawad Mahmood</i>	478
Energy management system for electrical grids based on Matlab, <i>Alexander Kroggel, Rajesh Saiju, Nashla Shakya</i>	484
Assets forecasting and power management of DC-Based MG under dynamic pricing for smart cities, <i>Mahmoud S. Abdel-Majeed, Mostafa S. Hamad, Alaa Khalil, Ayman S. Abdel-Khalik, Eman Hamdan</i>	490
Intellectual distribution of protection and automation functions to IEDs on digital power station, <i>Aleksandr Voloshin, Evgeny Voloshin, Aleksandrina Alekseeva, Evgeny Rogozinnikov, Stepan Shapkin</i>	495
Different optimization techniques for solving the coordination problem of DOCRs, <i>Ahmed Korashy, Salah Kamel, Hossein Shahinzadeh, Ersan Kabalci, Francisco Jurado</i>	499
Impact of cyber-attacks on EV charging coordination: the case of single point of failure, <i>Erdem Gumrukcu, Ali Arsalan, Grace Muriithi, Charukeshi Joglekar, Ahmed Abouledeh, Mustafa Alparslan Zehir, Behnaz Papari, Antonello Monti</i>	506
Optimal battery sizing & dispatch model for transformer loss reduction: a new local service, <i>Semanur Sancar, Emin Kartci, Gokturk Poyrazoglu</i>	512
Market-Clearing price forecasting using Keras in Turkish day-ahead electricity market, <i>Mikail Purlu, Belgin Turkey, Cenk Andic, Esra Aydin, Bilal Canol, Burak Kucukaslan</i>	517
Investigation of residential demand response flexibility including the effects of the COVID-19 pandemic on energy usage habits in Turkey, <i>Medine Munevver Tanugur, Mustafa Alparslan Zehir</i>	523
Smart energy management system: a comparative study of energy consumption prediction algorithms for a hotel building, <i>Adila El Maghraoui, Fatima Ezzahra Hammouch, Younes Ledmaoui, Ahmed Chebak</i>	529
Cloud-based optimal energy scheduling of photovoltaics and electric vehicle-integrated community microgrids, <i>Mustafa Alparslan Zehir, Osman Tufan Dogan, Hakan Merdanoglu, Ertan Yakici, Serhan Duran, Hayri Can Akyildirim</i>	535

Raspberry Pi 4 and Python based on speed and direction of DC motor, <i>Hayder J. Habil, Q. A. Al-Jarwany, Majli N. Hawas, Mohannad J. Mnati</i>	541
Technical coordination of aggregated electric vehicle charging and residential loads at the medium voltage level, <i>Ferhatcan Dumlu, Mustafa Alparslan Zehir</i>	546
A game theory based optimal planning for a hybrid energy system considering time of use tariffs, <i>Fatemeh Rezayof Tatari, Hamed Bizhani, SM Muyeen, Liaqat Ali, Sanjeevikumar Padmanaban</i>	552
ICT enabled smart street parking system for smart cities, <i>Omar H Sabry, Nada O. Zakaria, Eman Hamdan, Mostafa Hamed, Ayman Abdelkhalik</i>	558
Configuration of the actor and critic network of the deep reinforcement learning controller for multi-energy storage system, <i>Paula Páramo-Balsa, Francisco Gonzalez-Longatt, Martha Noemi Acosta, Jose Luis Rueda Torres, Peter Palensky, Francisco Sanchez, Juan Manuel Roldán-Fernández, Manuel Burgos-Payan</i>	564
<i>TT5 - COMMUNICATION TECHNOLOGIES AND RESEARCHES</i>	
Verifiable security and privacy provisioning protocol for high reliability in smart healthcare communication environment, <i>Vincent O nyangaresi, Junchao Ma, Zaid A. Abduljabbar, Mustafa A. Al Sibahee</i>	569
Development of a mobile network scanner-analyzer of the local area network of a digital substation for the analysis of flows of the IEC 61850 standard to improve the reliability of a digital substation, <i>Anton Ivanov, Boris Safronov, Alexander Ryzhkov, Alexander Voloshin</i>	575
Smart energy management system: Blockchain-based smart meters in microgrids, <i>Oussama Laayati, Hicham El Hadraoui, Mostafa Bouzi, Ali El-Alaoui, Ahmed Kousta, Ahmed Chebak</i>	580
Channel estimation in intelligent reflecting surfaces for 5G and beyond, <i>Ural Mutlu, Yasin Kabalci</i>	586
Car to car hybrid radio frequency and visible light communication through multi-hop relaying, <i>Nancy A Elbaz, Mohamed Abaza, Mohamed Shehata, Mohamed El Mahallawy</i>	591
Dual wideband millimeter-wave stacked cylindrical-rectangular DRAs for 5G applications, <i>Farah Sultan Hasan, Saja Aldebes, Yanal Faouri</i>	596
IoT based smart refrigerator monitoring system, <i>Samirul Haque, Jahidul Islam, Md. Ether Deowan, Towfiq Mahmud Mridul, Nafisa Tabassum</i>	600

Analysis of unicast/broadcast switch over with regard to resource allocation for future cellular networks, <i>Mohamad Younes, Yves Louet</i>	605
Cooperative multicell downlink joint coordinated switched beamforming and user pairing, <i>Youssef Fakih</i>	611
A metamaterial absorber with ultrathin and flexible feature for microwave applications <i>Kutay Cuneray, Tayfun Okan, Nursel Akcam</i>	617
Predictive analysis of soil parameters for solar-powered smart irrigation system, <i>Vrishti D Dhruv, Samiksha Bharankar, Rahul Solanki, Jayesh Patil, Palak Maniar, Adil Sheikh</i>	621
A study on the effect of phase shifter quantization error on the spectral efficiency using neural network, <i>Reza Ghazalian, Sahar Golipoor</i>	626
Minimizing task offloading delay in NOMA-MEC wireless systems, <i>Tayyaba Irum, Muhammad Usman Ejaz, Maged Elkashlan</i>	632
A cooperative SWIPT-Hybrid-NOMA pairing scheme considering SIC imperfection for THz communications, <i>Haider W. Oleiwi, Nagham Saeed, Hamed Al-Raweshidy</i>	638
Energy management in an agile workspace using AI-driven forecasting and anomaly detection, <i>Habib Ullah Manzoor, Ahsan Raza Khan, Mohammad Al-Quraan, Lina Mohjazi, Ahmad Taha, Hasan Abbas, Sajjad Hussain, Muhammad Ali Imran, Ahmed Zoha</i>	644
Mobility management in the applications of 5G and beyond: a handover skipping topology analysis, <i>Syed Asad, Paulo Klaine, Rao Naveed Bin Rais, Sajjad Hussain, Qammer H. Abbasi, Muhammad Ali Imran</i>	650
Deep learning aided channel estimation approach for 5G communication systems, <i>Ural Mutlu, Yasin Kabalci</i>	655