

# **2023 IEEE Power and Energy Conference at Illinois (PECI 2023)**

**Champaign, Illinois, USA  
2-3 March 2023**



**IEEE Catalog Number: CFP2312J-POD  
ISBN: 979-8-3503-9941-7**

**Copyright © 2023 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:	CFP2312J-POD
ISBN (Print-On-Demand):	979-8-3503-9941-7
ISBN (Online):	979-8-3503-9940-0
ISSN:	2164-8271

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

## TABLE OF CONTENTS

Rotating Cryocooler Performance for Superconducting Rotor .....	1
<i>Jianqiao Xiao, Yiming Zhao, Richeek Dutta, Kiruba Haran</i>	
Design and Modeling of a Hybrid Fuel Cell-Photovoltaic Power System for a Fixed-Wing Unmanned Aircraft.....	6
<i>Afshin Balal, David Graves, Timothy Bushong, Richi Vyas, Tim Dallas</i>	
Deep Learning-Based Real-Time Anomaly Detection for Power Electronics-Dominated Grid.....	11
<i>Asef Zadehgol-Mohammadi, Mohsen Hosseinzadehtaher, Mohammad B. Shadmand</i>	
Second-Life Electric Vehicle Batteries in Residential Solar Storage Applications in Pakistan.....	16
<i>Osama Bin Rizwan, Sridhar Seshagiri</i>	
Analysis for Flutter Velocity in Large Wind Turbine Blade .....	22
<i>H. S. Sunil Kumar, R. B. Anand, K. R. Channakeshava, T. Rangaswamy, B. S. Shobha</i>	
Understanding Interdependencies in Cyber-Physical Power Systems - A Review .....	30
<i>Matias Vistnes, Jordon A. Grant, Vijay Venu Vadlamudi</i>	
Towards the Characterization of Cyber-Physical System Interdependencies in the Electric Grid .....	38
<i>Shamina Hossain-McKenzie, Nicholas Jacobs, Adam Summers, Ryan Adams, Chris Goes, Abheek Chatterjee, Astrid Layton, Katherine Davis, Hao Huang</i>	
Resilient Distribution System Restoration with Equitable Load Shedding .....	46
<i>Dakota Hamilton, Dionysios Aliprantis</i>	
Impact of Ambient Stresses on Partial Discharge Measurement in Electric Machines Under Industrial Environmental Conditions.....	54
<i>Waqar Hassan, Ghulam Amjad Hussain, Muhammad Kamran, John A. Kay</i>	
Predicting Voltage Changes in Low-Voltage Secondary Networks Using Deep Neural Networks.....	59
<i>Jubair Yusuf, Joseph A. Azzolini, Matthew J. Reno</i>	
Considerations for Secure Data Exchange to Achieve Cyber-Physical Situational Awareness in the Electric Grid .....	67
<i>P. Cordeiro, A. Chavez, S. Hossain-McKenzie, A. Stenger, S. Bayless, R. Clark, S. Behrendt, J. Hawkins, K. Davis</i>	
Artificial Intelligence-Based Frequency Trajectory Prediction to Enhance Power Electronics- Dominated Grid Resiliency .....	74
<i>Mohsen Hosseinzadehtaher, Silvanus D'Silva, Ahmad Khan, Mohammad B. Shadmand</i>	
Utilizing Water Towers for Pumped Storage Hydropower .....	80
<i>Jonathon Kenneth Schuh</i>	
Current Sensorless PO-PSO MPPT Control for PV Systems Based on Dynamic Observer .....	87
<i>Kushal Buch, Himanshu R. Chavan</i>	
Analysis, Design, and Hardware Implementation of Three, Five, and Seven-Level H-Bridge Inverter Using Arduino.....	93
<i>Afshin Balal, Ayda Demir, Scott Clark, Michael Giesselmann, Stephen Bayne</i>	

Modeling and Operation of Microgrids for Deep Space Habitats Under Environmental Disturbances .....	100
<i>Leila Chebbo, Muhammed Ali Gultekin, Ali Bazzi, Ryan Tomastik, Krishna Pattipati, Luca Vaccino, Mohsen Azimi, Alana Lund</i>	
Data-Driven Based Corrective Actions and Detection of Intrusive Sensors Behavior in Power Electronic Dominated Grids .....	105
<i>Hamideh Alvand, Alireza Zare, Mohammad B. Shadmand, Haitham Abu-Rub</i>	
An LSTM-Based Anomaly Classification Framework for Power Electronics Dominated Grids.....	111
<i>Matthew Baker, Mohammad B. Shadmand</i>	
Simultaneous Utilization of the Self-Capabilities of PMSG-Based Wind Turbine for Power Smoothing .....	118
<i>Hadhlul Aladhyani, Hamdan Alosaimi, Subhashish Bhattacharya</i>	
PV System Control as STATCOM with SVM-Based Islanding Detection.....	123
<i>Hamdan Alosaimi, Hadhlul Aladhyani, Subhashish Bhattacharya</i>	
Feasibility Study of MicroHydropower Potential of River Rutui as Part of Rural Electrification in Kenya .....	130
<i>John Limo, Sridhar Seshagiri</i>	
PMU-Controlled Residential Battery Storage with Geothermal Heat Pumps in Distribution System .....	136
<i>Joshua Joseph, Ilya Grinberg</i>	
A New Approach for Transmission Expansion Planning Considering UPFCs.....	141
<i>Mojtaba Ahanch, Mehran Sanjabiasasi, Yaser Toghani Holari, Roy A. McCann</i>	
Integrated Magnetics, Insulation and Cooling Architecture for Slotless Electric Machines.....	147
<i>Dongsu Lee, Noah Salk, Thanatheepan Balachandran, Paige Powell, Kiruba Haran</i>	
Robustness of Communication-Free VOC Inverter Versus Communication-Based Load-Sharing Inverter with Side-Channel Noise Intrusion.....	153
<i>Sourojit K. Mazumder, Alan Mantooth</i>	

## **Author Index**