2024 IEEE PES/IAS PowerAfrica

Johannesburg, South Africa
7-11 October 2024

Pages 1-486

IEEE Catalog Number: CFP24PES-POD
ISBN: 979-8-3503-8939-5

Copyright © 2024 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:	CFP24PES-POD
ISBN (Print-On-Demand):	979-8-3503-8939-5
ISBN (Online):	979-8-3503-8938-8

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

Table of Contents

Renewable Energy Site Assessment with Multi-Criteria Decision-Making 1
Xander K. Abbey, Abayomi Adebiyi and Katleho Moloi

Parametric sensitivity analysis of the modified AMOCO model for an anaerobic digester .. 7
Bethlehem Abera, Torsten Wik, Getachew Bekele and Mengesha Mamo

Space Vector Modulation Techniques Comparison for Capacitor Voltage Balancing of Five-Level Inverters 12
Kevin Acadine, Augustin Mpanda Mabwe and Ahmed El Hajjaji

Multiagent Deep Reinforcement Learning for Reactive Power Control in Distribution Grids 17
Kwabena Addo, Katleho Moloi, Musasa Kabeya and Evans Eshiemogie Ojo

Optimal Integration of Distributed Renewable Generation for Reliability Improvement in Distribution Network 22
Abel Airoboman, Adeleke Aderibigbe and Reginald Ogu

Development of a GSM Enabled Real-Time Electronic Display Board 27
Abel Airoboman, Chijioke Okwuokenye, Aderibigbe Adeleke and Reginald Ogu

The Role of Ports as Green Energy Hubs: A Case for Lamu Port, Kenya 32
John Akumu, Peter Musau and Mathews Amuti

Prioritization of evaluation indices for optimal planning of distribution system: A fuzzy-best-worst approach 37
Moshood Alao and Olawale Popoola

Dynamic Restful API framework and deployment using Docker: Enhancing IoT deployment strategies 42
Ahmed Ali

Performance Analysis of MIMO Channel Simulator with New Modified Parameterization Methods ..... N/A
Ahmed Ali

Integrating Image Steganography Techniques into an Existing Efficient Image Recognition Artificial Neural Network for Optimal Performance ..... N/A
Ahmed Ali

Reducing Carbon Footprint in Rural Communities: A Case Study of Omupo Solar Rice Mill 59
Abdullateef Aliyu and Rislan Abdulazeez Kanya

Investigating Reactive Power Model for Constant Voltage Profile During Multiple Contingencies in Nairobi Load Centers Using Power World Simulation Tool. 62
Wyclife Odongo Amolo, Peter Musau Moses Musyoki and Abraham Nyete

Role of Electricity Supply Industry Structure in Power Quality Management in Namibia .. 67
Hilde Amushembe and K.S. Sastry Musti

Very Short-term Solar Irradiance Forecasting for Photovoltaic Power Integration with the Grid: Potentials and Challenges for Africa 72
Martin Ansong, Thomas Nyachoti Nyang'Onda, Robinson Juma Musembi and Bryce Sydney Richards

Impact of Wayside Energy Storage on the Power Quality of 3 kV DC Traction Power Systems 77
Chasheral Babunandan, Olanrewaju Lasabi and Andrew Swanson

Towards a Physics-Informed Neural Network Approach for Modeling and Prediction of Renewable Energy Production: Use Case of Solar Cells 82
Ange Taboria Baelongandi, Witesyavwirwa Vianney Kambale, Amos Mulenga Nzung, Marivaux Nzaji Bampende, David Krame Kadurha and Kyandoghere Kyamakya

Detection and Separation of multiple Partial Discharges sources on Power Transformers – Case Study 87
Sofiane Bakkay, Mükremin Yanan and Îlker Çalişkan

Coordinated Voltage Regulator and Smart Inverter Settings with High Penetration of DERs: A Systematic Review and Bibliometric Analysis 92
Olufunke Abolaji Balogun, Peter Anuoluwapo Gbadega, Kayode Timothy Akindeji, Vusani Nemudzivhadi and Yanxia Sun

Economic and Energy Security Optimisation of a Hybrid Microgrid Using Machine Learning 97
Julian Banks and Sunetra Chowdhury

Failure Analysis of Pole-Mounted Distribution Transformers in Rural Areas: A Case Study of DGVCL an Indian DISCOM ..... N/A
Gautam Bhatt and Nirav Patel

Solar PV Renewable Energy Sources: A Comprehensive Bibliometric Analysis ..... N/A
Sarel Botes, Tlhokaboyo Innocentia Mokwana and Bessie Baakanyang Monchusi

Limited-size BESS for mitigating the impact of RES volatility in grid-tied microgrids in developing countries: focus on Lacor Hospital 111
Corrado Maria Caminiti, Enrico Ragaini, Jacopo Barbieri, Aleksandar Dimovski and Marco Merlo

Double-Stator Electric Vehicle Motors: A-State-Of-The-Art Review 116
Wisani Chabalala, Udochukwu Akuru and Josiah Munda

An Energy Demand Analysis and Emission Reduction Potential of Electric Buses for Cities in Developing Economies: A Case Study of Nairobi, Kenya. 122
Mercy Chelangat, Babak Fahimi and Paul Kanja

Review of literature on different algorithms of economic dispatch : A comprehensive examination of methods, applications and performance characteristics. 127
Patrice Koffi Chetangny, Kekely Moïse Kwoasi Biramah, Laurent Medewou, Victor Zogbochi, Jacques Aredjodoun, Marcaire Agbomahena, Sossou Houndedako, Gérald Barbier and Didier Chamagne

Modernization of the South African Power Grid 132
Vasu Chetty and Innocent Davidson

Power System Modeling Tools for Sustainable Development: A Review 136
Albert Chitandula, Anas Abuzayed, Francis Mulolani, Kumbuso Joshua Nyoni, Musa Ndiaye and Albert Solà Vilalta

Spacecraft Electrical Power Management Systems – System Review 141
Jonas Dakora and Innocent Davidson

Determining Pollution Performance Curves of HTV SR Insulators Tested in a Severe Coastal Environment 145
Richardo Davey, Wallace Vosloo and Johannes Cornelius Bekker

Development of a Method For Estimating Solar and Wind Potential Based On Data Analysis 150
Mèhundo Walix Leslie De, Patrice Koffi Chetangny, Victor Zogbochi, Gerald Barbier, Didier Chamagne and Macaire Agbomahena

Smart Monitoring and Control Systems for Rural MicroGrids 155
Renier de Lange, Renier van Rooyen, Nick Singh, Johnny Rudolph and Carl van den Berg

Continuity of Supply in Urban Areas of Sub-Sahara Africa: Opportunities with Grid Modernization ..... N/A
Merkebu Zenebe Degefa, Lova Carhel Andriamasy, Anthony Granville and Andrianjaka Rakotomanantsoa

Analysis of Electricity Access in South Sudan and Proposed Solutions for Securing Reliable and Affordable Energy 165
Jacob Manyuon Deng, Cyrus Wabuge Wekesa, Khan Jean De Dieu Hakizimana and Joseph Nzabahimana

Managing Prosumers' Economic Impact: Policy and Strategy Solutions for Mini-Grid Developers 170
Henock Dibaba, Antti Pinomaa and Samuli Honkapuro

Impact of Dynamic Voltage Support of Large-scale PV Plants on Frequency Stability in the Senegalese Power System 175
Ndeye Khady Diop Dieng, Ousmane Manga Adamou, Martin Wolter, Niang Ababacar and Lamine Thiaw

A Hybrid Islanding Detection Technique using Voltage Positive Feedback and Frequency Deviation in GFM based Microgrid 182
Alioune Diouf and Yasuhiro Noro

PV Parking System Design: A Bibliometric Analysis ..... N/A
Sifiso Dlamini, Tlhokaboyo Innocentia Mokwana and Bessie Baakanyang Monchusi

Assessing Cable Sizing for PV Microgrids: Economic and Environmental Factors in Focus - A Case Study of Ethiopia and Rwanda 192
Jimmy Ehnberg, Milky Ali Gelchu and Pierre Damien Uwitije

Impacts of AC Filter Tripping at Songo Rectifier Station in Southern Africa 197
Leonel Fanequico, Chandima Gomes and John Van Coller

Optimizing Off Grid Renewables Using Data Driven Energy Storage and Management for Rural African Electrification ..... N/A
Laura Gachanja and Opondo Broono

Review of potential cyber-attacks in smart microgrid 206
Felicidade Pemba Kinzo Garcia, Atanda K. Raji and Khaled M. Abo-Al-Ez

Effectiveness of Wind Energy Penetration in Power System for Mitigating Transmission Congestion ..... N/A
Anurag Gautam, Gulshan Sharma, Mohammad F. Ahmer and Pitshou N. Bokoro

Reliability and Maintainability Assessment of the Infrastructure Components in Electric Power Distribution Network: A Case Study of Lekki Injection Substation 218
Peter Gbadega, Yanxia Sun, Kayode Timothy Akindeji and Mbekezeli S Maduna

A bio-inspired framework for Hyperparameter Optimization of an XGBoost model in main bearing fault diagnostics 223
Samuel M. Gbashi, Obafemi O. Olatunji, Paul A. Adedeji and Nkosinathi Madushele

Hybrid quantum convolutional neural network for defect detection in a wind turbine gearbox 230
Samuel M. Gbashi, Obafemi O. Olatunji, Paul A. Adedeji and Nkosinathi Madushele

Challenges and Opportunities of Electric Mobility in East Africa: Review and Recommendations 236
Mhret Berhe Gebremariam

Analysis Of Load Composition Impact On the Bankability Of Rural Mini-Grids 241
Milky Gelchu and Jimmy Ehnberg

The impact of Load-Shedding on estimates of Depreciation for Diesel Backup Generators at Public Health Facilities in Gauteng ..... N/A
Mark Gordon

Performance Evaluation of AI-Driven Photovoltaic Output Forecasting 251
Hatem Haddad, Feres Jerbi and Issam Smaali

Techno-Economic Analysis of PV-Wind with Hybrid Storage for Voltage Profile Improvement and Power Loss Reduction 256
Jean Bosco Hategekimana, Augustin Nkundibiza, Sylvere Mugemanyi and Musengimana Antoine

GIS-Based Evaluation of Suitability and Implementation Prospects for Solar PV Energy in Africa 261
Benedikt Häckner, Christoph Zink, Maximilian Pfennig and David Geiger

Consideration of Mutual Torque in Sizing of Double Stator Wound-Field Flux Switching Machine for Heavy-Duty Traction Motors 268
Hillary Idoko, Udochukwu Akuru and Olawale Popoola

Implementing and Assessing a GIC Measurement Hardware Framework 272
Munashe Jambawo, David Oyedokun and Pitambar Jankee

Small-Signal Stability Assessment of the Integration of Renewable Energy Sources to the Grid ..... N/A
David Joy and Arthur Ekwue

Research Gaps and Directions on Mini-Grid Control Strategies for Isolated Communities in Developing Countries 282
Shaibu Juma, Sarah Ayengo and Cuthbert Kimambo

The Technological Disruption Caused by the Composite Insulator Crossarm in the Electrical Energy Transmission Sector ..... N/A
Roberto Junior, Carlos Kleber Arruda, Ricardo Garcia, João Clavio Salari Filho, Adriano Dellallibera and Jeff Butler

A Review of green hydrogen as an upcoming energy storage technology 292
Stefan Karamanski, Jan-Hendrik Grobler and Thabo Hlalele

Advanced Intelligent Traffic Management System(AITMS): A Generative AI-Enhanced Model 297
Pius Kariuki, Joan Chepkoech and Japheth Okello

Implementation of a Unified Power Flow Controller for Two Interconnected Solar Mini-grids 300
Nicole Juliana Kawaako, Laurie Jovia Insaigha, Anthony Milton Edimu and Frank Ssemakula

LV Distribution Network Modelling: Suggested Practices for Developing Countries 306
Shafiqa Keddar, Ryan Sims, Scott Strachan and Damien Frame

Smart Charging of Electric Vehicles on the Grid Based on Social Spider Swarm Intelligence Algorithm 311
Raymond Kene, Thomas Olwal and Mpho Lencwe

Lessons learned from quantifying IEC 61850 station bus performance 317
Themesha Khan and Resham Singh

Reviewing the Energy Security Challenges and Risks in the Eastern Africa Power Pool Grids 322
Galila Khougali

Two-Area Automatic Generation Control System with Economic Dispatch using Integral Controller ..... N/A
Justine Kipchumba, Christopher Muriithi and Stanley Kamau

Design and Simulation of a Hybrid Banana Dryer that Uses Solar Thermal and Biogas ... N/A
Patrick Kiseegerwa and Ivodius Mwetware

Optimal Power flow on 132kV Line with Service Potential Transformer Substations: A case study of Juja-Rabai line. 337
Joel Mwithui Kitheka, Peter Musau Moses, Abraham Mutunga Nyete and Nicodemus Odero Abungu

Exploring the Anode Materials for Lithium-ion Batteries: A Review ..... N/A
Alex Koech, Gershom Mwandila, Francis Mulolani and Phenny Mwanga

Performance studies of electric and combustion engines: the case of a conventional vehicle in Benin 347
Mahoudjro Esli Koussouali, Patrice Koffi Chetangny, Victor Zogbochi, Macaire Agbomahena, Gérald Barbier and Didier Chamagne

System Disturbance Classification Model for a Low Voltage Distribution Network 352
Buchizya Kumwenda, Esau Zulu and Musa Ndiaye

Data Driven Artificial Neural Network Fault Classification By Bayesian Optimazation 357
Sipho Lafleni, Mbuyu Sumbwanyambe and Tlotlollo Hlalele

Managing Embedded Generation Integration: Challenges and Solutions for Distribution Substation Earthing 363
Manoj Lalbahadur and Mohamed Fayaz Khan

Simplified, Robust Method for Cloud Predictions for Photovoltaic Estimations 368
Tony Lange and Ellie Joffee

State-Space Formulation and Analysis of Distributed Control for Voltage Restoration and Proportional Current Distribution in DC Microgrids 374
Olanrewaju Lasabi, Andrew Swanson, Leigh Jarvis and Anuoluwapo Aluko

Optimal sizing of hybrid battery-supercapacitor energy storage system for improved vehicle starting performance 380
Mpho J. Lencwe, Thomas O. Olwal, Sp Daniel Chowdhury and Raymond O. Kene

Potential Criteria for Evaluating Maintenance Strategies in the Power System 385
Kebaone Letimela and Nhlanhla Mbuli

Life-cycle cost analysis of electricity backup solutions: a South African case study 390
Lizzy Letoaba, Tebello Mathaba and Bongumusa Cebekhulu

design of hybrid electrical energy storage for solar integration, case of Chad 395
Emmanuel Loubadoum, Peter Moses Musau and Emmanuel Loubadoum

Correlation between sunshine duration and climatic variables in the Democratic Republic of Congo 400
Dieudonné Lusamba Yangindu, Mbuyu Sumbwanyambe, Edmond Phuku Phuati and Jean-Marie Tshitenge Mbuebue

Modeling the solar irradiance of the Democratic Republic of Congo by sunshine duration . 406
Dieudonné Lusamba Yangindu, Mbuyu Sumbwanyambe, Edmond Phuku Phuati, Jean-Marie Tshitenge Mbuebue and Max Seke Vangu

Short-Term Load Forecast in Power System Using Neural Network 412
Tshililo Magoro, Olawale Popoola and Khuthadzo Kgopana

Enhancing power quality and the corresponding expenses in distribution networks with high levels of harmonic loads. 417
Tolulope Makanju, Oluwole Famoriji, Ali Hasan and Thokozani Shongwe

Examining Different Input Formulations for Load Prediction in Regional Power Grids During N-1 Contingencies Utilizing Machine Learning Techniques 423
Tolulope Makanju, Oluwole Famoriji, Ali Hasan and Thokozani Shongwe

Design of a Low-Cost Smart Solar-Powered Irrigation System 428
Kanyanta Makasa and Kangwa Mukuka

Discussion of the application of IEEE Std 1459-2010 to Power Electronics 433
Thapelo Makhalanyane and Ivan Hofsajer

Mitigating Unit Trips: A Case Study of Condensation Management in Vacuum Transmitter Readings at Kriel Power Station 438
Kgomotso Manyapetsa

Precious Photons: A Geospatial Benchmarking of the Value of Sun Tracking in Solar PV Systems in Sub-Saharan Africa . . . . . N/A
Lefu Maqelepo, Tunmise Raji, Nathan Williams and Tsabalira Phoofolo

Wound Field Flux Switching Machine Performance Under Switched Field Excitation 448
Lesedi Masisi and Udochukwu Akuru

Analysis of Effectiveness of DGA Methods in Fault Identification: Case Study of an HVDC Converter Transformer . . . . . N/A
Amina Jamal Matsinhe and Maxcêncio Tamele

Analysis of Power Transformer Maintenance for Improved Reliability and Cost Efficiency: A case-study in South Africa 456
Azwitamisi Mavhungu, Tebello Mathaba and Jan Pretorius

Development of hybrid Ultracapacitor and Lithium-Ion Battery Energy Storage System . . . 461
Buasa Andy Mayingi, Mpho J Lencwe, Sp Daniel Chowdhury and Louwrance J Ngoma

Perfomance comparison of Machine Learning (ML) based fault detection scheme for a compensated transmission line. 466
Ntombenhle Mazibuko, Kayode Akindeji and Katleho Moloi

An Assessment to Determine Energy Surplus in an Isolated Hybrid Energy System 471
Thokozile Mazibuko, Katleho Moloi and Kayode Akindeji

Application of Delphi Technique in Determining the Potential Criteria of Substation Site Selection 477
Thandeka Mbundu and Nhlanhla Mbuli

Solar PV-Battery Sizing for SA Tourism: A Data and Simulation Backed Graphical Analysis Method 482
Bradley Mercuur and Clint Steed

Overview Of Power Quality Improvement On Three Phase On Z Source Inverter . . . . . N/A
Phumelele Mhlongo, Musasa Kabeya, Mbulelo Ngongoma and Sandile Dlamini

Enhancing Energy Access in Africa through Artificial Intelligence: Opportunities and Challenges 492
Ebikella Mienye, George Obaido, Priye Kenneth Ainah, Ikiomoye Douglas Emmanuel and Ibomoiye Domor Mienye

Analysis of a Medium Voltage Direct Current Distribution System for Integration of an Electric Vehicle Ultrafast Charging Station: A Case Study 498
Khanyisani Mlondo, Mohamed Fayaz Khan and Olanrewaju Lasabi

Active power reserve provision with large-scale WES and BESS 503
Siphelele Joseph Mndiya, Mukovhe Ratshitanga and Senthil Krishnamurthy

Overview of Dual-Port Machines for Wind Power Generator Applications 509
Ziphilele Mngomezulu, Mpumelelo Mlonzi, Udochukwu Akuru and Olawale Popoola

Autonomous Accident Detection and Alert System ..... N/A
Siyabonga Marvin Mpangane and Tlhokaboyo Innocentia Mokwana

Automatic Traffic Control Light using the IOT ..... N/A
Ndumiso Mthobela, Hulisani Matsila and Bessie Monchusi

Comparison of Operational Energy Yield Assessments to Pre-construction Energy Yield Assessments for Solar Photovoltaic plants 524
Liz Mubari and Thompho Ramahana

Location-based Sizing of Battery Energy Storage for Voltage Regulation in MV/LV Distribution Networks 527
Mapfumo Frank Mudimu, John Michael Van Coller and Lesedi Masisi

Electricity Outages in Uganda: Causes, Trends and Regional Disparities 532
Joel Mugyenyi, Vijay Modi and Isaac Kinhonhi

Verification of PMU Optimal Placement in Power Distribution Networks Using Synchrophasor Measurements and Real-time Simulation 537
Obed Muhayimana, Petr Toman, Abir Lahmer, Mohammed Laamim and Abdelilah Rochd

Degradation Classification of Low-Voltage Zinc Oxide Varistors using K-NN Algorithm ... 542
Lutendo Muremi and Pitshou Bokoro

Analysis of Zinc Oxide Grain Barrier under Slow-Front Overvoltages 547
Lutendo Muremi and Pitshou Bokoro

ENSURING A PEOPLE CENTERED ENERGY TRANSITION TO POWER AFRICA . N/A
Emmanuel Musundi

Opportunities for productive uses of electricity in the off-grid market 557
Olivia Muza and Valerie Thomas

Smart and Low-Cost Transceiver for Energy Sharing and Billing Towards Swarm Grid Implementation 562
Joseph Sisala Mwakijale, Kamrul Hassan Safin and Ulrich Hilleringmann

Is AC or DC Distribution Line the Way Forward for Solar Swarm Grid Implementation? . 566
Joseph Sisala Mwakijale and Ulrich Hilleringmann

Robust Servomechanism Multivariable Control Scheme for Grid-Following Photovoltaic LCL- Voltage Source Converter 570
Francis Mwasilu, Olorunfemi Ojo and Bakari Mwinyiwiwa

Evaluating the Different Clean Energy Demand Drivers: Case studies on Operating Mini-grids on Lolwe Island and Bunjaako Island 575
Charlene Nagawa, Jane Namaganda Kiyimba, Dorothy Okello and Wei He

Literature Review: PV Parking System Design using Solar Tracking ..... N/A
Aradhna Naidoo, Tlhokaboyo Innocentia Mokwana, Bessie Baakanyang Monchusi and Mbuyu Sumbwanyambe

Will South Africa Achieve Sustainable Development Goal 7 By 2030? 587
Kashika Naidu, Ashnie Maharaj, Sibusiso Zincume, Dudley Naidoo and Katleho Moloi

Orientation of corona rings for optimal performance in 132kV double tension string insulators 592
Sanjay Narain, Andrew Swanson and Mohamed Fayaz Khan

Leveraging Solar-Powered Routers to Provide Internet Connectivity in Underserved Communities 597
Micheal Nasasira, Micheal Nasasira, Brian Masiga, Arthur Tumwesigye and Victor Turyahebwa

SETTING ENERGY EFFICIENCY TARGETS TO MEET CORPORATE GOALS 601
Simphiwe Ncwane, Peter Mukoma and Thabo Hlalele

Utilizing an Anti-Reflective Coating with Inverted Pyramid Texture to Enhance Solar Panel Efficiency ..... N/A
Racheal Joy Ndibazza, Deogratias Atugonza, Milton Anthony Edimu and Jane Namaganda Kiyimba

Simulating And Analyzing SA Distributed Solar Generating System In Transmission Line Expansion Network ..... N/A
Nomihla Ndlela, Katleho Moloi and Musasa Kabeya

Economic analysis of a hybrid micro-grid with battery energy storage 616
Given Ndlovu, Fiona Oloo, Sumi Moodaliyar and Thabo Hlalele

An Economic Performance Overview of Microgrids for Limpopo Province Rural Areas 621
Pfesesani Shammah Netshilonwe, Fhulufhelo Nemangwele and Mukovhe Ratshitanga

OPTIMIZATION OF DSTATCOM IN DISTRIBUTION NETWORK FOR PERFORMANCE IMPROVEMENT 628
Urbanus Ngei and Peter Moses

Extraction of heat and electric energy from wastewater sludge through a gasification process: DWSIM and COCO simulator approach 633
Simphiwe Gift Nkuna, Thomas Otieno Olwal, Sp Daniel Chowdhury and Julius Musyoka Ndambuki

Evaluation of Power Grid Voltage Instability Point using System Overloading Contingency in Real-time Simulation 638
Sinawo Nomandela, Mkhululi Mnguni and Atanda Raji

An Analysis of Sudan's Solar Sector During The Ongoing Conflict, and The Impact of The Economic and Political Factors on Accelerating The Renewable Energy Transition ... N/A
Hadeel M. Nour and Mohammed M. Nour

Enhancing biogas production and use by remote data acquisition and analysis-Household biogas use in Rwanda as case for the study. . . . 646
James Ntaganda, Evariste Twahirwa, Geoffrey Gasore, Jane Mukamugema, Alphonsine Mukashyaka, Oreste Niyonsaba, Basilio Z. Salvador Tamele and Telephore Kabera

Integration of Electric Vehicles and Renewable Energy Distributed Generators into the Smart Grid using Optimization Method . . . 653
Mlungisi Ntombela, Musasa Kabeya and Katleho Moloi

HIL simulation and testing of the distribution network's automatic reconfiguration . . . 658
Sikho Ntshiba, Senthil Krishnamurthy and Sinawo Nomandela

Power Planning in Hydropower Plants Using Artificial Intelligence: A Case Study of Nigeria . . . 663
Chidozie Nwobi-Okoye, Stephen Takim and Stanley Okiy

Performance Simulation of a LoRa Low Power WAN CubeSat in Earth Observation Missions . . . 668
Odwa Vincent Nxam, Janvier Kamanzi and Innocent E Davidson

Expert Analysis of Lightning Impulse Failure Modes in Oil-Filled Power Transformers Based on Experiential Data . . . 674
Bafana Nyandeni and Bonginkosi Thango

Solar- and IoT-Based Smart Irrigation System using Fuzzy Logic for Sustainable Agriculture . . . 679
Deans David Nyathi and Lutendo Muremi

Optimal Sizing of Residential Photovoltaic (PV) - Battery Power System in an Off-grid Configuration . . . 684
Bansendeka Theo Nyingu, Lebogang Masike and Mwana Wa Kalaga Mbukani

IMPACT ANALYSIS OF OPTIMUM PHASOR MEASUREMENT UNIT PLACEMENT ON WESTERN KENYA POWER NETWORK . . . 691
Edward Nyonje, Michael Saulo, Edwin Ataro and Edwin Okendo

Generation of Artificial Datasets for Fault Detection in Induction Motors Using Extreme Learning Machine . . . 696
Amos Mulenga Nzung, Witesyavwirwa Vianney Kambale, Marivaux Nzaji Bampende, Ange Taboria Baelongandi, Mohamed Salem and Kyandoghere Kyamakya

A High Speed Encoderless Field Oriented Control of Synchronous Reluctance Motor with Reduced Current Ripples . . . N/A
Cosmas Ogbuka

IoT-enabled Inverter with Smart Battery Usage . . . 708
Ayodeji Ogunjuyigbe, Temitope Raphael Ayodele, M J Afolabi, O J Taiwo, Thapelo Mosetlhe and Adedayo Yusuff

Photovoltaic power load-matching challenge in a reverse osmosis water desalination system . . . 713
Emmanuel Ogunniyi and Bryce Richards

Review of Distributed Renewable Generation (DRG), Network Interconnection and Optimisation for the Global South. 718
Chukwudi Okpalajiaku, Anthony Ibe and Ephraim O. Chukwuocha

Design of a Solar PV Powered Cold Storage for Fish in Sena and Mrongo Beaches in Mfangano Island, Kenya 723
Boniface Okwach, Peter Musau Moses and Cyrus Wekesa

Optimisation of Capital Expenditure and Operational Expenditure of an Electrical Network: a Comparative study of optimisation problems to use 728
Paul Olamba Kalonda and Caleb Dubo Kasas

Comparative assessment of hydrogen production from wind and solar resources for electricity generation in Sokoto, Nigeria 734
Richard Olarewaju, Ayodeji Ogunjuyigbe, Temitope Raphael Ayodele, Thapelo Mosetlhe and Adedayo Yusuff

Computation of Electric Field in e-Machines Using Finite Element Analysis - Leakage Current and Simulation of an AC Hi-Pot Test 739
Avoki M Omekanda

Residential Electricity Consumption in Free State Townships: Unravelling the Pandemic Effect 743
Renier Oosthuizen, Nicolaas Luwes and Roshan Pillay

Design, Optimization, and Environmental Analysis of Hybrid Energy Systems for Integration in Remote Villages: A Case Study in Morocco 748
Norddine Oubouch, Redouane Abdelbari, Anouar Makhoukh and Abdennebi El Hasnaoui

Intermediate Stage Fault Classification for Wind Turbine Gearbox: A Comparative Analysis of Distance Metrics with k-NN Model 754
Opeoluwa Owolabi, Nkosinathi Madushele, Obafemi Olatunji and Paul Adedeji

Wireless Charging Coupler for Agricultural UAVs and Drones with T-Shaped Landing Gear 759
Gianluca Patrizi and Sampath Jayalath

Multi-Orbital Protection Schemes for Space-based Solar Power Systems 764
Ayodele Periola, Sinamandla Maqina and Innocent Davidson

Voltage Profile Improvement Employing A Synchronous Distributed Generator: A Case Study of Thailand's Distribution Network 771
Yutthakarn Phoarsai and Chaowanan Jamroen

Unlocking Green Hydrogen: Optimal Sizing of a Hybrid Power Supply for a Green Hydrogen Production Plant Using Metaheuristic Algorithms 776
Umeshan Pillay and Dr Mohamed Fayaz Khan

Electric energy demand and Supply aggregation for ECOWAS interconnected network 781
Ulrich Thierry Prodjinotho, Patrice Koffi Chetangny, Marcaire Agbomahena, Victor Zogbochi, Laurent Medewou, Jacques Aredjodoun, Hypolite Hounnou, Gérald Barbier and Didier Chamagne

Design of an Electrification Scheme using a Stand-Alone Solar PV Technology: A Case Study for the Informal Settlement in South Africa ..... N/A
Thulani Qwabe, Hulisani Matsila and Bessie Monchusi

Cryptocurrency Mining Powered by Solar Energy using a DC-DC Connection with IoT Control 792
Preston Rorich, Katleho Moloi, Thokozile Fortunate Mazibuko and Dwayne Jensen Reddy

Impact of Volt-Var and Volt-Watt Regulation Curves in the Accommodation of PV Generators to Distribution Systems 797
Franklin Saquinga, Diana Montenegro and Ivan Endara

Machine learning-based anomaly detection in residential electricity usage patterns using meter data- Case study (Msunduzi Municipality) 805
Cyncol Akani Sibiya, Kingsley A. Ogudo and Ereola J. Aladesanmi

LoRaWAN for remote monitoring applications in the smart grid – A Utility perspective .. 810
Resham Singh

Real-Time Dynamic Multi-User System For Monitoring And Assessment Of Distributed Energy Resources Compliance With Grid Codes – Grid.Compass ..... N/A
Srdan Skok, Hrvoje Pandzic and Mario Klaric

Shifting Paradigms: Z-Source Inverters as a Viable Solution for Enhanced DC-Link Regulation and Renewable Energy Integration 820
Elyas Smaida, Michael Juma Saulo, Kouzou Abdellah, Mary Ahuna, Ali Teta, Engidaw Abel Hailu and Steven Foday Sesay

Investigation into correlation between climate and lightning activity in South Africa and its potential impact on transmission infrastructure 825
Gavin Strelec and Renier Van Rooyen

Practical Consideration for Harmonic Analysis of Large Wind Farms: A Moroccan Power Grid Perspective 830
Jerry Su

A Methodology for Estimating Allocation of Electric Vehicle Grid Interfaces in a Distribution System 835
Imanthi Subasinghe and Ganesh Venayagamoorthy

Voltage Impact of Roof-Top Solar Photovoltaic Systems on Low Voltage Distribution Network ..... N/A
J.D.U. Sumeda

Isolation Forest and Local Outlier Factor Based Anomaly Detection on an Induction Machine 846
Elsie Fezeka Swana, Pitshou Bokoro and Wesley Doorsamy

Electric Design of an Electrified High-Speed Railway System Linking the Towns of Lusaka and Kitwe in Zambia 851
Abel Tambatamba and Maxim Shevlyugin

Investigating households and productive use electricity demand patterns in rural Mozambique 856
Basilio Zeloso Tamele, James Ntaganda, Adugnaw Lake Temesgen, Alberto Tsamba and Erik Ahlgren

Design and Implementation of a Fuzzy-Based Microgrid Energy Management System 861
Simbarashe Tanyanyiwa, Marshall Dzwene and Bright Tetteh

A Comprehensive exploration of renewable energy education landscape in Ethiopian public universities 866
Adugnaw Lake Temesgen, Getachew Bekele, Vanesa Castan Broto and Yacob Mulugeta

A high-resolution analysis of electricity demand for informed electrification planning 871
Adugnaw Lake Temesgen, Basilio Zeloso S. Tamele and Erik O. Ahlgren

Internet of Things-Based Smart Monitoring of a 400VA 220/110V Transformer 876
Bonginkosi Thango

Internet of Things-Based Transformer Winding Lumped Parameters Monitoring 882
Bonginkosi Thango

Measured and Simulated PD Characteristics of Closely Coupled Air Cavities in Polymeric Insulation 887
Mathew Thekiso, Cuthbert Nyamupangedengu and Isaac Kwabena Kyere

The Social Significance of Solar-PV Cooking – A Case Study of an Innovative Intervention in Zambia 892
Leticia Tomas Fillol, Antti Pinomaa, Karin Amukugo Fröhlich and Samuli Honkapuro

Intelligent-Based Techniques for Detection, Identification and Mitigation of Cyberattacks in Cyber-Physical Power Systems: A Review 897
Oluwaseun Tooki and Olawale Popoola

Design and Simulation of an Unmanned Aerial System (drone) for Flight Inspection: Review ..... N/A
Nhlupheheng Tsotetsi, Tope Olorunfemi and Bessie Monchusi

Impact of Large-Scale Solar Photovoltaic Integration on Weak Power Grids 910
Nestor Chima Ugwoke, Nnaemeka Sunday Ugwuanyi, Patrick Ifeanyi Obi, Innocent Onyebuchi Ozioko, Uma Uzubi Uma, Ikenna Chinazaekpere Ijeh, Ogechi Akudo Nwogu and Udochuckwu Bola Akuru

Techno-Economic Performance Optimisation of an Off-Grid Green Hydrogen Refueling Station 915
Gergo Varhegyi

IoT-based smart management of off-grid photovoltaic systems in rural and remote settings 922
Ishimwe Viviane, Mirco Mongilli, Rukundo Eraste, Guido Matrella and Paolo Ciampolini

OPTIMIZATION OF REACTIVE POWER DISPATCH FOR IMPROVEMENT OF VOLTAGE STABILITY USING HYBRID DIFFERENTIAL SQUIRREL SEARCH ALGORITHM 927
Daniel E. Wekesa, Keren K. Kaberere and Irene N. Muisyo

Regenerative Braking in Electric-Bicycles with Supercapacitors for Sustainable Transport . 932
Jude Worsfold, Kelvin Anoh, Kennedy Chinedu Okafor and Ian Lipscomb

A Comprehensive Review of Harmonic Mitigation Strategies in Power Distribution Systems and Microgrids with Inverter-Based Generation 937
Luvo Xaba and Sunetra Chowdhury

Trends in day-ahead electricity market prices in Southern Africa 942
Sydney Kadikula Zimba, Simbarashe Pasipamire and Elisha Mutambudzi

Proposing a Methodology to Evaluate the Feasibility and Implementation Potential of Wind Energy in Africa Using GIS Data 947
Christoph Zink, Benedikt Häckner, Maximilian Pfennig and Malte Lindenmeyer

Stochastic PV hosting capacity estimation using PEM based analysis . . . . . N/A
Esau Zulu, Buchizya Kumwenda and Musa Ndiaye

A Numerical Study of the Load Frequency Control Scheme for a Steam Plant Integrated with an Islanded Microgrid 959
Luyanda Zulu, Namhla Mtukushe and Evans Ojo

Optimization and Perfomance Analysis of a Smart Grid at Times of Fault Outbreaks Using Artificial Intelligence Techniques 964
Musawenkosi Zulu, Rudiren Sarma and Remy Tiako