# **2020 IEEE International Conference** on Power and Energy (PECon 2020)

**Virtual Conference** 7 – 8 December 2020



**IEEE Catalog Number: CFP20820-POD ISBN**:

978-1-7281-7069-5

## Copyright © 2020 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:
 CFP20820-POD

 ISBN (Print-On-Demand):
 978-1-7281-7069-5

 ISBN (Online):
 978-1-7281-7068-8

#### **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



### **CONTENT**

WELCOME MESSAGE	iii
ORGANISING COMMITTEE	iv
REVIEWERS	v
TECHNICAL PROGRAM	x
Monday, December 7	xi
Tuesday, December 8.	xiv
ABSTRACTS	N/A
AUTHORS INDEX.	xliii

#### Monday, December 7, 2020

Session : Keynote 1

Title : High Power Density AC-DC/ DC-DC/ DC-AC Conversion Techniques

Presenter : Professor Huang-Jen (National Taiwan University of Science and Technology)

Time : 10:15 - 11:00

Room : Online via MICROSOFT TEAMS

Chair : Assoc. Prof. Ir. Dr. Nadia Tan (Universiti Tenaga Nasional, Malaysia)

#### **SYNOPSIS**

Owing to the energy shortage and the rising awareness of environment protection, not only makes people pay attention to energy saving issue, but jointly affect the development trend of power electronic industries. According to the roadmap of power electronics industries, it includes improving energy conversion efficiency, decreasing components and increasing power density. The talk particularly focuses on high power density AC-DC/DC-DC/DC-AC conversion techniques for information technology, electric vehicles, and renewable energy applications.

Session : Keynote 2

Title : Status of Renewable Energy in Malaysia in 2020

Presenter : Dato' Ir. Dr. Ali Askar Sher Mohamad (Sher Engineering & Consultancy Sdn Bhd)

Time : 11:00 - 11:45

Room : Online via MICROSOFT TEAMS

Chair : Assoc. Prof. Ir. Dr. Nadia Tan (Universiti Tenaga Nasional, Malaysia)

#### **SYNOPSIS**

The government has decided to limit the maximum Reppa period to 10 years only; this goes against the spirit of NEM 2.0 which had an unlimited period for Reppa. Next year, the Government is introducing NEM 3.0 with many new conditions. The Large-Scale Solar (LSS4) has undergone many price changes from about 40 cents/kWh, now coming to less than 20 cents/kWh. However, looks like the Government is siding with TNB to bring the price down as much as possible. We have many residential units which require solar PV; these units should be able to sell at tariff rates. We can have a discount for the commercial and industrial units, say 20 % discount, but residential units should be able to sell at the existing tariff. The existing Feed in Tariff (FiT) is only for biogas, biomass and small hydro; all are now going for bidding where the price has dropped from 46.6 sen/kWh for biogas, to only 40 sen/kWh, including all the bonuses. However, the price has increased slightly for small hydro; biomass is also going for bidding in the coming year.

12:00 - 12:15: Announcement of the Best Paper Award

12:15 - 14:00 : Break

#### Monday, December 7, 2020

Time : 14:00 - 16:00

Session: A11: Power Electronics and Applications 1

Room : Virtual Room A

14:00 DC Circuit Breaker: A Comprehensive Review of Solid State Topologies...1

S M Sanzad Lumen (Universiti Teknologi Petronas (UTP), Malaysia & Bangladesh Power Development Board (BPDB), Bangladesh); Ramani Kannan (Universiti Teknologi Petronas, Malaysia); Nor Zaihar Yahaya (Universiti Teknologi PETRONAS, Malaysia)

14:20 Bidirectional DC-DC Converter with Extended Voltage Conversion Ratio for Energy Storage Applications...7

Azri Husni Hasani (Universiti Tenaga Nasional (UNITEN), Malaysia)

14:40 Active Power Filter Control Using Hybrid Fuzzy Proportional-Integral and Hysteresis Controllers for Mitigating the Harmonics Generated by Electric Vehicles...13

Fasalu Puthiyottil, Hussain Shareef and K Kiranmai (United Arab Emirates University, United Arab Emirates)

15:20 Boost Active Power Factor Correction Converter Using Various Current Controllers in Double Loop Control Algorithm...24

Nor Farahaida Abdul Rahman and Rahimi Baharom (Universiti Teknologi MARA, Malaysia)

15:40 Thermoelectric Generator for Charging Mobile Devices...29
Wong Kok Hong and Mohd Zaki Daud (Universiti Teknologi Malaysia, Malaysia)

Time : 14:00 - 16:00

Session: B11: Power System Operations and Planning 1

Room: Virtual Room B

- 14:00 Factors Affecting Load Pattern in a Tropical Electric Power Distribution Area...35

  Zacchaeus Adetona (The Federal Polytechnic Ilaro, Nigeria); Peter Mbamaluikem (Federal Polytechnic Ilaro, Nigeria)
- 14:20 Method of Calculation of Low-Frequency Electromagnetic Field Around 15 kV Transmission Lines...40

  Bat-Erdene Bayar (Power Engineering School & Mongolian University of Science and Technology, Mongolia)
- 14:40 An Intelligent Classification Method of Series Arc Fault Models Using Deep Learning Algorithm...44

  Alaa Omran, Dalila Mat Said and Siti Maherah Hussin (Centre of Electrical Energy Systems (CEES),

  Universiti Teknologi Malaysia, Malaysia); Sohrab Mirsaeidi (School of Electrical Engineering Beijing

  Jiaotong University, Malaysia); Yaser Abid (University of Information Technology and

  Communications, Iraq)
- 15:00 Blockchain Technologies in Electric Energy Systems...49

  Nazreen Junaidi and Mohamed Shaaban (Universiti Malaysia Sarawak, Malaysia); Md Pauzi Abdullah (Universiti Teknologi Malaysia, Malaysia)

15:20 The Utilization of an Energy Storage Facility in Dispatching Regulation of Power System...55
<u>Zagdkhorol Bayasgalan</u> (Power Engineering School, Mongolian University of Science and Technology, Mongolia); Bayasgalan Tsetsgee (School of Business Administration and Humanities, MUST, Mongolia)

15:40 Stabilization of Power System Including Wind Farm by Cooperative Operation Between HVDC Interconnection Line and Battery...60

<u>Ayaka Nakamura</u> (Kitami Institute of Technology, Japan); Faramarz Asharif (University of the Ryukyus & Graduate School of Science and Engineering, Japan); Atsushi Umemura, Rion Takahashi and Junji Tamura (Kitami Institute of Technology, Japan); Atsushi Sakahara, Fumihito Tosaka and Ryosuke Nakamoto (Hokkaido Electric Power Co., Inc., Japan)

Time : 16:00 - 18:00

Session: A12: Power Electronics and Applications 2

Room: Virtual Room A

16:00 Design and Analysis of Five-Level Cascaded LLC Resonant Converter...66

Salah Alatai (Universiti Sains Malaysia, Malaysia); Mohamed Salem (Universiti Sains Malaysia (USM), Malaysia); Dahaman Ishak, Mohamad Kamarol Mohd Jamil and Ali Bughneda (Universiti Sains Malaysia, Malaysia)

- 16:20 Design of a Novel SPWM Based on Bat-Like Reference Signal Technique for EV Applications...71

  <u>Ibraheem Mohammed Khalil AL- Jafeary</u> (Universiti Tenaga Nasional, Iraq); Nadia Tan (Universiti Tenaga Nasional, Malaysia)
- 16:40 Simulation Study of Single Event Burnout Hardening Technique on Power UMOSFET Using P-Island Layer...77

  Saranya Krishnamurthy (Universiti Teknologi PETRONAS, Malaysia); Ramani Kannan and Fawnizu Azmadi Hussin (Universiti Teknologi Petronas, Malaysia)
- 17:00 Geodesic Theory of Zero-Voltage-Switching RF Power Inverters for Constant-Voltage or -Current Output Operation...83

  Minoru Mizutani (Toyohashi University of Technology, Japan); Satoshi Koyama (Toyohashi University of Technology, Japan); Shinji Abe and Takashi Ohira (Toyohashi University of Technology, Japan)
- 17:20 Power Imbalance Compensation of Parallel Combining Twin Class-E Inverters by DC Current Detection Fed Back to Gate-Signal Phase Control...89

  Satoshi Koyama (Toyohashi University of Technology, Japan); Minoru Mizutani and Takashi Ohira (Toyohashi University of Technology, Japan)
- 17:40 Comparative Study of Optimization Algorithms for SHEPWM Five-Phase Multilevel Inverter...95
  Bimazlim Muhammad Aniq Shahmi (Universiti Malaysia Perlis, Malaysia)

Time : 16:00 - 18:00

Session: B12: Power System Operations and Planning 2

Room: Virtual Room B

16:00 Cooperative Virtual Inertia and Reactive Power Control of PMSG Wind Generator and Battery for Improving Transient Stability of Power System...101

<u>Takamasa Sato</u> (Kitami Institute of Technology, Japan); Faramarz Asharif (University of the Ryukyus & Graduate School of Science and Engineering, Japan); Atsushi Umemura, Rion Takahashi and Junji Tamura (Kitami Institute of Technology, Japan)

16:20 Optimal Placement of PMU for Complete Observability of Power System Considering Zero Injection and Islanding Condition...107

<u>Vidhya Sagar Devendran</u> and Jasronita Jasni (Universiti Putra Malaysia, Malaysia); Norhafiz Azis (Universiti Putra Malaysia & Centre for Electromagnetic and Lightning Protection Research, UPM, Malaysia); Mohd Amran Mohd Radzi (Universiti Putra Malaysia, Malaysia)

16:40 Rule-Based Enhanced Energy Management Scheme for Electric Vehicles Fast-Charging Workplace Using Battery Stacks and Solar Power...113

Zeeshan Ahmad Arfeen, Za (Universiti Teknologi Malaysia, Malaysia & The Islamia University Bahawalpur, Pakistan); Md Pauzi Abdullah and Usman Ullah Sheikh (Universiti Teknologi Malaysia, Malaysia); Aliyu Hamza Sule (Universiti Teknologi Malaysia, Malaysia, Malaysia); Hasan Alqaraghuli (Universiti Teknologi Malaysia, Malaysia); Rasaq Kolawole Soremekun (University Technology Malaysia, Malaysia)

- 17:00 Development of a Discrete Mathematical Model for Medium-Length Transmission Lines...119
  Saleh Al-Jufout (California State University, Long Beach, USA)
- 17:20 A Proposed FLISR Approach for Distribution Networks with Distributed Generators...125

  Phúc Duy Lê (Ho Chi Minh City University of Technology & Ho Chi Minh Power Corroperation, Vietnam); Duong Minh Bui (Vietnamese-German University, Vietnam); Cường Cao Ngô (Ho Chi Minh City University of Economics and Finance (UEF), Vietnam); Phuong Thanh Nguyen ((HUTECH) Ho Chi Minh University of Technology, Vietnam); Phúc Huỳnh and Minh Đoàn (Ho Chi Minh Power Corporation, Vietnam)
- 17:40 Effectively Determine Confidence Intervals of Bus Voltages Served for Setting Overcurrent Relays in Distribution Networks...131

Phúc Duy Lê (Ho Chi Minh City University of Technology & Ho Chi Minh Power Corroperation, Vietnam); <a href="Duong Minh Bui">Duong Minh Bui</a> (Vietnamese-German University, Vietnam); Cường Cao Ngô (Ho Chi Minh City University of Economics and Finance (UEF), Vietnam); Duy C Huynh (Ho Chi Minh City University of Technology (HUTECH), Vietnam); Hoan Thanh Nguyễn (Ho Chi Minh Power Corporation, Vietnam); Dũng Nguyễn (Mekong University, Vietnam)

#### Tuesday, December 8, 2020

Time : 8:30 - 10:30

Session: A21: Power Electronics and Applications 3

Room: Virtual Room A

- 8:30 A Review of High-Frequency Transformers for Bidirectional Isolated DC-DC Converters...137

  Yasir Sabah Dira (University Tenaga Nasional, Malaysia); Nadia Tan (Universiti Tenaga Nasional, Malaysia); Ahmad Ramli (Universiti Tenga Nasional, Malaysia)
- 8:50 Current Cutoff Behavior Observed When Twin Rectifiers Combine Their DC Output Power in Parallel...143

  Ryoya Honda, Korya Chiathong, Shinji Abe and Takashi Ohira (Toyohashi University of Technology,
  Japan)
- 9:10 Analysis and Design of an Improved Single Switch Quadratic DC/DC Converter for Continuous Conduction Mode (CCM) Operation in Renewable Energy Systems...148

  Amr Kamal and Hany A. Bastawrous (The British University in Egypt, Egypt)
- 9:30 Implementation of a Robust Hydrogen-Based Grid System to Enhance Power Quality...153

  Sheikh Tanzim Meraj and Nor Zaihar Yahaya (Universiti Teknologi PETRONAS, Malaysia); Balbir Singh Mahinder Singh and Ramani Kannan (Universiti Teknologi Petronas, Malaysia)

9:50 *Uninterruptible Power Supply (UPS) Using Double Conversion Technique...***159**<u>Lee Kar Kuan</u> (Universiti Teknlogi Malaysia, Malaysia); Mohd Zaki Daud (Universiti Teknologi Malaysia, Malaysia)

10:10 Switched-Capacitor-Based Modular T-Type Inverter with Reduced Switch Count...165

Saifullah Kakar (University of Technology, Malaysia); Shahrin Md. Ayob and Norjulia Mohamad Nordin (Universiti Teknologi Malaysia, Malaysia); Sze Sing Lee (Newcastle University in Singapore, Singapore); M Saad Bin Arif (Universiti Teknologi Malaysia, Malaysia)

Time : 8:30 - 10:30

Session: B21: Power System Operations and Planning 3

Room: Virtual Room B

8:30 Assessment of Expected Customer Interruption Cost Due to Power System Contingency by Sensitivity Analysis...171

Siti Nur Atikah A Majid and <u>Nur Ashida Salim</u> (Universiti Teknologi MARA, Malaysia); Hasmaini Mohamad (University of Technology MARA, Malaysia); Zuhaila Mat Yasin (Universiti Teknologi Mara, Malaysia)

8:50 Utilising Rate of Change of Positive Sequence of Voltage as an Anti-Islanding Strategy for Distributed Generation...176

Nuraishahtul Amirah Mohd Fadzil (University of Technical Malaysia Malacca, Malaysia); Mohd Hendra Hairi, Farhan Hanaffi and Muhammad Nizam Kamarudin (Universiti Teknikal Malaysia Melaka, Malaysia); Mohamed Fauzi Packeer Mohamed (Universiti Sains Malaysia, Malaysia); Sharizal Ahmad Sobri (Universiti Malaysia Kelantan, Malaysia)

- 9:10 Distribution Generation Planning in Distribution Network Using Ant Lion Optimizer...182

  <u>Zuhaila Mat Yasin</u> (Universiti Teknologi Mara, Malaysia); Mohamad Radzman Rusdi and Zuhaina

  Zakaria (Universiti Teknologi MARA, Malaysia)
- 9:30 Fault Signature Analysis Based on Digital Fault Recorder in Malaysia Overhead Line System...188
  Saidatul Habsah Asman (Universiti Tenaga Nasional Malaysia, Malaysia); Nur Fadilah Ab Aziz
  (Universiti Tenaga Nasional, Malaysia); Mohd Zainal Abidin Abd Kadir (Prof, Malaysia); Ungku Anisa
  Ungku Amirulddin (Universiti Tenaga Nasional, Malaysia)
- 9:50 Analysis of Geomagnetic Induced Current Modelling and Calculation in Electrical Power Grid...194
  Nur Fadilah Ab Aziz (Universiti Tenaga Nasional, Malaysia); Zuhaila Mat Yasin (UiTM, Malaysia); Nur
  Ashida Salim (Universiti Teknologi MARA, Malaysia); Anis Adiba Zawawi (Universiti Tenaga
  Nasional, Malaysia)
- 10:10 Fault Signature Analysis for Medium Voltage Overhead Line Based on New Characteristic Indices...198
  Saidatul Habsah Asman (Universiti Tenaga Nasional Malaysia, Malaysia); Nur Fadilah Ab Aziz
  (Universiti Tenaga Nasional, Malaysia); Mohd Zainal Abidin Abd Kadir (Prof, Malaysia); Ungku Anisa
  Ungku Amirulddin (Universiti Tenaga Nasional, Malaysia)

Time : 10:30 - 12:30

Session: A22: Renewable Energy Technologies and Issues 1

Room: Virtual Room A

10:30 *IoT-based Hybrid Renewable Energy Harvesting System from Water Flow...204*<u>Hazlee Azil Illias</u> and Nabilah Syuhada Ishak (University of Malaya, Malaysia); Hazlie Mokhlis (University of MAlaya, Malaysia); Md Zahir Hossain (University of Malaya, Malaysia)

- 10:50 Harmonic Mitigation for a Megawatt Grid-Tied Fuel Cell System...209

  Mohamed Salem (Universiti Sains Malaysia (USM), Malaysia); Khlid Ben Hamad (Cape Peninsula University of Technology, South Africa)
- 11:10 PV System Sizing to Cover the Electricity Shortage in a Residential Quarter in Iraq...214

  Mustafa Hussein Abo Alwez, Jasronita Jasni and Mohd Amran Mohd Radzi (Universiti Putra Malaysia,

  Malaysia); Norhafiz Azis (Universiti Putra Malaysia & Centre for Electromagnetic and Lightning

  Protection Research, UPM, Malaysia)
- 11:30 Determining Optimal Tilt Angle to Maximize the PV Yield...219

  Hasan Masrur (University of the Ryukyus, Japan); Ts. Ir. Mohammad Lutfi Othman (Universiti Putra Malaysia & Advanced Lightning, Power and Energy Research (ALPER), Malaysia); Ahmed Amirul Arefin (Universiti Teknologi PETRONAS, Malaysia); Hashim b. Hizam (UPM, Malaysia); Noor Izzri Abd. Wahab (Universiti Putra Malaysia, Malaysia); Syed Zahurul Islam (Universiti Tun Hussein Onn Malaysia UTHM, Malaysia); Tomonobu Senjyu (Faculty of Engneering, University of the Ryukyus, Japan)
- 11:50 Control of Battery Energy Storage System for Peak Shaving Using Enhanced Time of Use Scheme...224

  Mohammed Ghazwan Mohammed Almufti (University Technology Malaysia (UTM), Malaysia); Rasli
  Abdul Ghani (Universiti Teknologi Malaysia, Malaysia)
- 12:10 Study the Combining Magnet Edge Shaping and Dummy Slot on the Performance of PMG for Wind Power Applications...229

<u>Tajuddin Nur</u> (Atma Jaya Catholic University, Indonesia); Karel Octavianus Bachri (Atma Jaya Catholic University of Indonesia & Bandung Institute of Technology, Indonesia); Ilyas Mansur (Politeknik Negeri Fak-Fak Papua, Indonesia); Marsul Siregar, Jr (Atma Jaya Catholic University of Indonesia Jakarta & PT WTE, Indonesia)

Time : 10:30 - 12:30

Session: B22: High Voltage Engineering & Technology 1

Room: Virtual Room B

- 10:30 Assessment the Overall Health Condition of Transformer Using Health Index and Critical Index Approach: TNB Grid Case Study...235

  Tajul Ariffin Aman (Universiti Teknologi Malaysia, Malaysia)
- 10:50 Transformer Ageing Investigation and Correlation of Furanic Compound and Degree of Polymerization for Power Transformer Life Assessment...240
  Mohd Aizam Talib (TNB Research, Malaysia); Mohd Azhar Abdul Aziz (TNB Research Sdn Bhd, Malaysia); Yogendra Balasubramaniam (TNBR, Malaysia); Young Zaidey Yang Ghazali (Tenaga Nasional Berhad, Malaysia); Mohd Rasyidi Zainal Abidin (Engineer, Malaysia); Mohd Fairouz Mohd Yousof (Universiti Tun Hussein Onn Malaysia, Malaysia)
- 11:10 Sectionalization of Degraded Polymeric Cable with Multiple Joints Using TDR Technique...245

  Tze Mei Kuan and Azrul Mohd Ariffin (Universiti Tenaga Nasional, Malaysia); Wong Jee Keen Raymond (Tunku Abdul Rahman University College, Malaysia)
- 11:30 Aging Effects on Thermal and Dielectric Properties of Polypropylene/Magnesium Aluminate Nanocomposites...251
   <u>Aizat Azmi</u> (Universiti Teknlogi Malaysia, Malaysia); Kwan Yiew Lau (Universiti Teknologi Malaysia, Malaysia); Noor Azlinda Ahmad (Institute of High Voltage & High Current, Universiti Teknologi

Malaysia, Malaysia); Zulkurnain Abdul-Malek (Universiti Teknologi Malaysia & Institute of High Voltage and High Current, Malaysia); Chee Wei Tan (Universiti Teknologi Malaysia, Malaysia); Kuan

11:50 Thermal and Dielectric Properties of Thermally Aged Polypropylene/Calcium Carbonate Nanocomposites...255

Aizat Azmi (Universiti Teknologi Malaysia, Malaysia); Kwan Yiew Lau (Universiti Teknologi Malaysia, Malaysia); Noor Azlinda Ahmad (Institute of High Voltage & High Current, Universiti Teknologi Malaysia, Malaysia); Zulkurnain Abdul-Malek (Universiti Teknologi Malaysia & Institute of High Voltage and High Current, Malaysia); Chee Wei Tan and Razman Ayop (Universiti Teknologi Malaysia, Malaysia)

12:10 Electromagnetic Analysis of Underground Cables for Upcoming Smart City: Case Study...259

Balaji Sriram (Indian Institute of Technology Kanpur, India); Vidhya Sagar Devendran (Universiti Putra Malaysia, Malaysia); Sharmeela Chenniappan (India)

Time : 12:30 - 14:30

Session: A23: Renewable Energy Technologies and Issues 2

Room: Virtual Room A

- 12:30 Techno-Economics of Solar PV Systems on the Commercial Malls Rooftops...264

  Meshal M. Al-Shammari (King Saud University & Saudi Electricity Company, Saudi Arabia); Essam A. Al-Ammar (King Saud University, Saudi Arabia)
- 12:50 Composite Trapezoidal Rule-Based Maximum Power Point Tracking Algorithm for Photovoltaic Systems Under Complex Shading Conditions...270

  Neda Mahmod Mohammad Altwallbah and Mohd Amran Mohd Radzi (Universiti Putra Malaysia, Malaysia); Norhafiz Azis (Universiti Putra Malaysia & Centre for Electromagnetic and Lightning Protection Research, UPM, Malaysia); Suhaidi Shafie (UPM, Malaysia); Muhammad Ammirrul Atiqi Mohd Zainuri (Universiti Kebangsaan Malaysia & Faculty of Engineering and Built Environment, Malaysia)
- 13:10 Harmonic Distortion Improvement Considering Bulk Charging Station and Distributed Generation..276

  Syed Norazizul Syed Nasir, Razman Ayop and Jasrul Jamani Jamian (Universiti Teknologi

  Malaysia)
- 13:30 Influence of State of Charge on Deformation Induced Mechanical Failure in Li-Ion Cells...282

  Siddharth Aphale (K. K. Wagh Institute of Engineering Education and Research, India); Soham Lulla and Siddhi Marathe (K. K. Wagh Institute of Engineering Education & Research, India)
- 13:50 Li-Ion Batteries for Electric Vehicles: Requirements, State of Art, Challenges and Future Perspectives...288
  Siddharth Aphale (K. K. Wagh Institute of Engineering Education and Research, India); Ayush Kelani (K. K. Wagh Institute Of Engineering Education And Research, India); Vijay Nandurdikar (K. K. Wagh Institute of Engineering Education And Research, India); Soham Lulla (K. K. Wagh Institute of Engineering Education & Research, India); Sambhav Mutha (Zoox Inc, USA)
- 14:10 Buck Converter Design for Photovoltaic Emulator Application...293

  Razman Ayop, Chee Wei Tan, Syed Norazizul Syed Nasir and Kwan Yiew Lau (Universiti Teknologi Malaysia, Malaysia); Chuen Ling Toh (Universiti Tenaga Nasional, Malaysia)

Time : 12:30 - 14:30

**Session: B23: Smart Grid Technologies and Issues** 

Room: Virtual Room B

12:30 Exploring the Application of Phasor Measurement Units in the Distribution Network...299
Yiksing Yeung and Chi Kin Lau (CLP Power Hong Kong Limited, Hong Kong)

- 12:50 Non-Intrusive Load Monitoring: A Computationally Efficient Hybrid Event Detection Algorithm...304

  Attique Ur Rehman (Auckland University of Technology, New Zealand); Shafiqur Rahman Tito
  (Manukau Institute of Technology, New Zealand); Tek Tjing Lie (Auckland University of Technology,
  New Zealand); Pieter Nieuwoudt, Neel Pandey and M. Daud Ahmed (Manukau Institute of
  Technology, New Zealand); Brice Vallès (Auckland, New Zealand)
- 13:10 Grey Wolf Accretive Satisfaction Algorithm for Optimization of Residence Energy Management with Time and Device-Based Preferences...309

  Sara Ayub (UTM MAlaysia, Pakistan); Shahrin Md. Ayob and Chee Wei Tan (Universiti Teknologi Malaysia, Malaysia); Lubna Aziz (Student of Masters, Pakistan)
- 13:30 Fault Classification and Location for Distribution Generation Using Artificial Neural Networks...315
  Kheng Hong Foo and Wong Jee Keen Raymond (Tunku Abdul Rahman University College, Malaysia);
  Oon Kheng Heong (University Malaya, Malaysia); Tze Mei Kuan (Universiti Tenaga Nasional, Malaysia)
- 13:50 Design and Real-Life Deployment of a Smart Nanogrid: A Greek Case Study...321

  Apostolos C. Tsolakis, Angelina Bintoudi and Lampros Zyglakis (Centre for Research and Technology Hellas, Greece); Stylianos Zikos (CERTH, Greece); Christos Timplalexis, Napoleon Bezas and Konstantinos Kitsikoudis (Centre for Research and Technology Hellas, Greece); Dimosthenis Ioannidis and Dimitrios Tzovaras (Information Technologies Institute, Greece)
- 14:10 Ethereum Blockchain-Based Peer-To-Peer Energy Trading Platform...327

  <u>Aigerim Iskakova</u> (Nazarbayev University, Kazakhstan); Sivanand Kumar Nunna (Nazarbayev University, Astana, Kazakhstan); Pierluigi Siano (University of Salerno, Italy)

Time : 14:30 - 16:30

Session: A24: Renewable Energy Technologies and Issues 3

Room: Virtual Room A

- 14:30 Assessment of Online Weather Platform Data for PV Output Power Forecasting...332

  Zaim Zulkifly (Universiti Teknikal Malaysia Melaka & Centre of Robotics and Industrial Automation, Malaysia); Kyairul Azmi Baharin and Chin Kim Gan (Universiti Teknikal Malaysia Melaka, Malaysia)
- 14:50 Investigating the Utility of Perturbation and Observation, Incremental Conductance and Grey-Wolf MPPT Techniques for ON-Grid PV System Under Fluctuated Environmental Conditions...338
  Mohamed A. Khafagy (The British University in Egypt (BUE), Egypt); Peter Makeen Toghyan Besada (The British University in Egypt, Egypt & London South Bank University, United Kingdom (Great Britain)); Merna M. Eshak (The British University in Egypt (BUE), Egypt); Sameh Osama (Lecturer, The British University in Egypt, Egypt); Hani A. Ghali (British University in Egypt (BUE), Egypt)
- 15:10 Game Theoretical Energy Management of EV Fast Charging Station with V2G Capability...344

  <u>Himadry Shekhar Das</u> and S. Li (The University of Alabama, USA); Md. Fahim Chowdhury (Auburn University, USA); Tonmoy Ghosh (The University of Alabama, USA)
- 15:30 Probabilistic Sizing of Battery Energy Storage System for Solar Photovoltaic Output Smoothing...350

  Wei Hown Tee (Universiti Teknikal Malaysia Melaka (UTeM), Malaysia); Chin Kim Gan, Junainah Sardi and Kyairul Azmi Baharin (Universiti Teknikal Malaysia Melaka, Malaysia); Kok King Kong (Maqo Technologies (M) Sdn. Bhd., Malaysia)
- 15:50 Prediction Model of Wind Speed and Direction Using Convolutional Neural Network Long Short Term Memory...356
  Anggraini Puspita Sari (Tokushima University, Japan); Hiroshi Suzuki (Graduate School of Tokushima University, Japan); Takahiro Kitajima and Takashi Yasuno (Tokushima University, Japan); Dwi Arman Prasetya and Nachrowie (Universitas Merdeka Malang, Indonesia)

16:10 Design and Fabrication of Glass Based MEMS Patch Antenna for Energy Harvester...362

<u>Jumril Yunas</u> (Universiti Kebangsaan Malaysia, Malaysia); Noor Hidayah Mohd Yunus (Universiti Kuala Lumpur BMI, Malaysia); Jahariah Sampe (Universiti Kebangsaan Malaysia (UKM) & Institute of Microengineering and Nanoelectronics (IMEN), Malaysia); Asep Nandiyanto (Universitas Pendidikan Indonesia, Indonesia)

Time : 14:30 - 16:30

Session: B24: High Voltage Engineering & Technology 2

Room: Virtual Room B

14:30 Lightning Detection System Efficiency from Lightning Strike Density Analysis for Light Rail Transit...366 Wisnu Adyatma S and Reynaldo Zoro (Bandung Institute of Technology, Indonesia)

14:50 The Effect of Nanofiller and Temperature on Dielectric Properties of Polypropylene-Based Dielectric Material...371

<u>Henry Santoso</u> (Institut Teknologi Bandung & PT. PLN, Indonesia); Andrea Cavallini (University of Bologna, Italy); Suwarno Suwarno (Institut Teknologi Bandung, Indonesia)

- 15:10 Protection Against Emf at Transmission Line and Tower...376

  Avinash Raj (TNB Research Sdn Bhd, Malaysia); Lee Ping and Maria Farhana (Heriot Watt University, Malaysia)
- 15:30 Ageing Detection of Metal Oxide Surge Arrester Using Fifth Harmonic Resistive Current...382

  Abdullah Munir (University of Technology Malaysia, Malaysia); Zulkurnain Abdul-Malek (Universiti Teknologi Malaysia & Institute of High Voltage and High Current, Malaysia)
- 15:50 Study of Soil Resistivity Using Wenner Four Pin Method: Case Study...386

  Muhammad Syazlan Sazali (University Malaysia Perlis, Malaysia); Chin-Leong Wooi and Syahrun Nizam Md Arshad Hashim (Universiti Malaysia Perlis, Malaysia); Tian-Seng Wong (MEI Consultant Sdn Bhd, Malaysia); Zulkurnain Abdul-Malek (Universiti Teknologi Malaysia & Institute of High Voltage and High Current, Malaysia); Hadi Nabipour Afrouzi (Swinburne University of Technology, Malaysia)

Time : 16:30 - 18:30

Session: A25: Electrical Machines and Drives / Industrial Applications

Room: Virtual Room A

- 16:30 Design Modifications for Cogging Force Reduction in Linear Permanent Magnet Machines...392

  Praveen Kumar and Lovesh Xaxa (IIT(BHU), Varanasi, India); Rakesh Kumar Srivastava (Indian Institute of Technology Banaras Hindu University, India)
- 16:50 Controllable Electric Vehicle Fast Charging Approach Based on Multi-Stage Charging Current Methodology...398

<u>Peter Makeen Toghyan Besada</u> (The British University in Egypt, Egypt & London South Bank University, United Kingdom (Great Britain)); <u>Hani A. Ghali</u> (British University in Egypt (BUE), Egypt); Saim Memon (London South Bank University, United Kingdom (Great Britain))

17:10 Applications on STM32NUCLEO Microcontroller for Pulse Switching Using Time Delay and Trigonometric Function with MATLAB SIMULINK...404
Shamsul Zulkifli (Universiti Tun Hussein Onn Malaysia, Malaysia)

- 17:30 Static Watt Compensator and Battery Energy Storage System for Frequency Stability Considering Smelter: A Comparison...409

  Amirah Ayu Mudhiah Fahren and Kevin Marojahan Banjar-Nahor (Institut Teknologi Bandung, Indonesia); Claysius Dewanata Widjaja (Institut Teknologi Bandung & IEEE Student Member,
- 17:50 An Efficient Linearized Volterra Series for Nonlinear Model Predictive Control in Dynamic Systems...415

  Hossein Zeynal (Buein Zahra Technical University, Iran); Zuhaina Zakaria (Universiti Teknologi MARA, Malaysia); Ahmad Kor (Tehran Farayand Dena Company, Iran); Ahmad Yaghoobi (Tehran,

Indonesia); Nanang Hariyanto (STEI ITB, Indonesia)

18:10 Analysis and Prediction of Glove Quality Based on Manufacturing Factors...420

<u>Ai Hui Tan</u> (Multimedia University, Malaysia); Chin Leei Cham (Multimedia University); Esther Hee Ying Lim (Multimedia University, Malaysia)