

# **COVER PAGE**

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**2020 4th International Conference on  
Green Energy and Applications  
(ICGEA 2020)**

Workshop  
The 8th International Conference on  
**Electrical Energy and Networks  
(ICEEN 2020)**

**NTU@one-north, Singapore | March 7-9, 2020**

**Co-sponsored By**



**Published By**



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# **WELCOME**

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Dear distinguished delegates,

It is our great honor and pleasure to welcome you to 2020 4th International Conference on Green Energy and Applications (ICGEA 2020) and its workshop- The 8th International Conference on Electrical Energy and Networks (ICEEN 2020). The conferences are held in Singapore on March 7-9, 2020.

ICGEA and ICEEN 2020 keep promoting the information exchange on Green Energy and Electrical Energy and aims to promote international cooperation and provide an opportunity for researchers around the world to exchange ideas and the latest research results. The evaluation of all the papers was performed based on the reports from anonymous reviewers, who are qualified in the field of Green Energy and Applications as well as Electrical Energy and Networks. As a result of their hard work, we are pleased to have accepted 36 presentations coming from initially from around 67 submissions. The presentations are divided into 1 poster session and 4 parallel sessions with the topic on Power Systems and Smart Grids; Electrical Engineering and Automation; Electronics and Energy Engineering as well as Energy and Environmental Engineering.

A word of special welcome is given to our keynote speakers who are pleased to make contributions to our conference and share their new research ideas with us. They are Prof. Udaya K. Madawala, from The University of Auckland, New Zealand; Prof. Changyun Wen, from anyang Technological University, Singapore; and Prof. Dennis Leung, from The University of Hong Kong, Hong Kong.

We'd like to express our heartfelt appreciation to our conference chairs, keynote speakers, session chairs, authors, and audiences. Thanks to your support and help, we can hold this conference successfully and always keep making progress. We wish and hope that you will enjoy this conference in a comprehensive experience embracing Green Energy and Electrical Energy as well as culture, friendship, and this famous country. Wish you all enjoy your staying here. Thank you for your attention!

We look forward to meeting you again next time!

Yours sincerely,

Conference Chair  
Prof. Wang Peng, IEEE Fellow  
Nanyang Technological University, Singapore

# AGENDA OVERVIEW

## March 7, 2020 ( Saturday) | Conference Preparations & Tutorial

10:00-17:00	Registration & Materials Collection	Lobby(Third floor)
14:00-14:50	Tutorial	SR907(Ninth floor)
14:50-15:10	Coffee Break	Outside the meeting room
15:10-16:00	Tutorial	SR907(Ninth floor)

## March 8, 2020 ( Sunday) Morning | Opening & Keynote Speeches

09:30-9:40	Opening Remarks- Prof. Wang Peng	LT301(Third floor)
09:40-10:20	Keynote Speech I - Prof. Udaya K. Madawala	LT301(Third floor)
10:20-10:30	Group Photo	
10:30-10:40	Coffee Break & Poster Presentations	
10:40-11:20	Keynote Speech II- Prof. Changyun Wen	LT301(Third floor)
11:20-12:00	Keynote Speech III- Prof. Dennis Leung	LT301(Third floor)
12:00-13:30	Lunch	Outside the meeting room

## March 8, 2020 (Sunday) Afternoon | Authors' Parallel Presentations

13:30-15:45	Session1-- Power Systems and Smart Grids	SR706(Seventh floor)
	Session2-- Electrical Engineering and Automation	LT301(Third floor)
15:45-16:00	Coffee Break	
16:00-18:15	Session3-- Electronics and Energy Engineering	SR706(Seventh floor)
	Session4-- Energy and Environmental Engineering	LT301(Third floor)
18:15-20:00	Dinner	Outside the meeting room

## March 9, 2020 ( Monday) | Social Program

Local Custom Self-Experience

# VENUE

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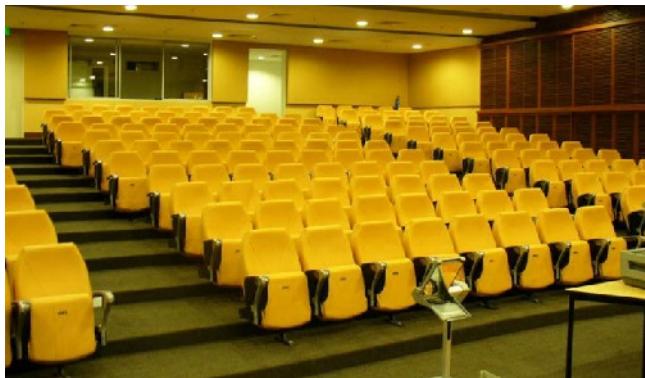
## Conference Venue

### NTU@one-north

Add: 11 Slim Barracks Rise, (off North Buona Vista Road), NTU@one-north campus,  
Executive Centre #09-09, Singapore

Web: <http://www.ntu.edu.sg/odfm/onenorth/Pages/onenorth.aspx>

A research-intensive public university, Nanyang Technological University, Singapore (NTU Singapore) has 33,000 undergraduate and postgraduate students in the colleges of Engineering, Business, Science, and Humanities, Arts and Social Sciences, and its Graduate College. NTU's Lee Kong Chian School of Medicine was established jointly with Imperial College London.



# VENUE

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**How to get to the NTU@one-north from Singapore Changi Airport?**

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➤ **Taxi**

 Taxi----Around 27 minutes (28.7km)

➤ **The affordable way:**

Bus+  Walking---around 70 minutes

Get on **the East West Line at Singapore Changi Airport**

↓(2 Stations)  
Get off at **Tanah Merah**

↓  
Get on **the East West Line at Tuas Link**

↓(17 Stations)  
Get off at **Buona Vista**

↓ (550m)  
**NTU@one-north campus**

**Tips:**

 **Currency: S\$**

 **Emergency Call: 999**

# DETAIL AGENDA

**March 7, 2020 (Saturday) | 10:00-17:00**

 **Registration & Materials Collection**

 **Lobby (Third floor)**



Give your **Paper ID** to the staff.



**Sign your name** in the attendance list and check the paper information.



Check your **conference kit**, which includes conference bag, name tag, lunch coupon, conference program, the receipt of the payment, the USB of papers collection.

## ! Attention

- ❖ In order to keep everyone's property safe, kindly notice that only the participants wearing the attendance card can be allowed to enter the meeting room. If you have any accompanying person, please do inform our staff in advance when you do the registration. Thanks for your understanding and cooperation.
- ❖ Please always keep your belongings with you. The organizer of the conference does not assume any responsibility for the loss of personal stuff.
- ❖ Don't stay too late in the city, don't be alone in the remote area. Be aware of the strangers who offer you service, signature of charity, etc., at many scenic spots.

 **March 7, 2020 (Afternoon) | 14:00-16:00**

<b>SR907 (Ninth floor)</b>	<b>Tutorial</b>	<b>Dr. Deepak L. Waikar</b> Managing Partner, EduEnergy Consultants LLP Energy Researcher, Educator and Trainer, The Republic of Singapore <b>Speech Title:</b> Synergising Clean Energy & Green Transportation Policy & Technology Innovations for Smart Cities
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# DETAIL AGENDA

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## Poster Guideline

### Please read it carefully:

- ❖ Please bring your own poster.
- ❖ Prepare the Poster

\*Your poster should cover the KEY POINTS of your work.

\*The title of your poster should appear at the top about 25mm (1") high.

\*The author(s) name(s), affiliation(s) and mailbox are put below the title.

\*Posters are required to be condensed and attractive. The characters should be large enough so that they are visible from 1 meter apart. Suggested Poster with size of A1 (594mm×840mm width\*height), with conference short name and paper ID on right up corner.

- ❖ During poster session, the author should stand by your poster, explaining and answering doubts or questions.
- ❖ Carefully prepare your poster well before the conference. All illustrations, charts, etc., to be posted should be prepared in advance as materials for these purposes will not be available at the meeting site.



## Oral Presentation Guideline

- ❖ Get your presentation PPT files prepared. Please copy your PPT to the computer 15 minutes before your session on March 8. The size of PPT is 16:9.
- ❖ Regular oral presentation: 15 minutes (including Q&A).
- ❖ Laptop, projector & screen, laser sticks will be provided by the conference organizer.
- ❖ Certificate of Presentation will be awarded after the session by the session chair.
- ❖ One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded after the session by the session chair.

# DETAIL AGENDA

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[March 8, 2020 (Sunday)] Morning

 Opening & Keynote Speeches

 LT301 (Third floor)

09:30-09:40	Opening Remarks	<b>Prof. Wang Peng, IEEE Fellow</b> Nanyang Technological University, Singapore
9:40-10:20	Keynote Speech I	<b>Prof. Udaya K. Madawala, IEEE Fellow</b> The University of Auckland, New Zealand <b>Speech Title:</b> Wireless EV Charging for V2G Applications
10:20-10:30	<b>Group Photo</b>	
10:30-10:40	<b>Coffee Break &amp; Poster Presentations</b>	
10:40-11:20	Keynote Speech II	<b>Prof. Changyun Wen, IEEE Fellow</b> Nanyang Technological University, Singapore <b>Speech Title:</b>
11:20-12:00	Keynote Speech III	<b>Prof. Dennis Leung</b> The University of Hong Kong, Hong Kong <b>Speech Title:</b> Applications of low grade and waste aluminum for powering portable devices and sensors

Lunch @ Outside the meeting room

<12:00-13:30>

# DETAIL AGENDA

[March 8, 2020 (Sunday)] Afternoon  
Authors' Parallel Presentations

⌚ SR706 (Seventh floor)	
13:30-15:45 	<b>Session 1 -- Power Systems and Smart Grids</b> Chaired by --
	<b>9 Presentations</b> G2-1001, G2-002, G1-057, G1-027 G1-031, G1-034, G1-050, G1-053, G1-022
15:45-16:00	 Coffee Break   Outside Meeting Room
16:00-18:15 	
	<b>Session 3 -- Electronics and Energy Engineering</b> Chaired by –
	<b>9 Presentations</b> G1-014, G1-029, G1-049, G1-058 G1-032, G1-047, G1-048, G1-054, G1-055
⌚ LT301 (Third floor)	
13:30-15:45 	<b>Session 2 -- Electrical Engineering and Automation</b> Chaired by –
	<b>9 Presentations</b> G2-1003, G1-011, G1-016, G1-017 G1-024, G1-026-A, G1-028, G1-007, G1-025
15:45-16:00	 Coffee Break   Outside Meeting Room
16:00-18:15 	
	<b>Session 4-- Energy and Environmental Engineering</b> Chaired by --
	<b>9 Presentations</b> G2-007, G1-006, G1-009, G1-019 G1-021, G1-002, G1-023, G1-033, G1-060

Dinner @ Outside the meeting room  
<18:15-20:00>

# KEYNOTE SPEAKER

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**Prof. Udaya K. Madawala, IEEE Fellow**

**The University of Auckland, New Zealand**

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**Speech Title:** Wireless EV Charging for V2G Applications

**Abstract:** Electric vehicles (EVs) improve air-quality, offer grid services through the vehicle-to-grid (V2G) concept and are ideal for sustainable living. As a result, they are becoming increasingly popular as the means of future transport. For V2G applications, EVs essentially require a bi-directional power interface with the electricity network (grid) to allow for both storing (charging) and retrieval (discharging) of energy, which can be achieved by either wired or wireless means. The latter, based primarily on Inductive Power Transfer (IPT) technology, is more attractive being convenient, safe, and ideal for both stationary and dynamic (while on the move) charging of EVs. This seminar presents trends and the latest advances in grid integration of EVs for V2G applications, highlighting the standards, challenges and future directions. Both wired and wireless technologies are discussed, focusing particularly on the bi-directional wireless power transfer (BD-WPT) technology developed for V2G applications.

**Bio:** Udaya K. Madawala graduated with a B.Sc. (Electrical Engineering) (Hons) degree from The University of Moratuwa, Sri Lanka in 1987, and received his PhD (Power Electronics) from The University of Auckland, New Zealand in 1993 as a Commonwealth Doctoral Scholar. At the completion of his PhD, he was employed by Fisher & Paykel Ltd, New Zealand, as a Research and Development Engineer to develop new technologies for motor drives. In 1997 he joined the Department of Electrical and Computer Engineering at The University of Auckland and, at present as a Full Professor, he focuses on a number of power electronics projects related to wireless grid integration of EVs for V2G applications and renewable energy. Udaya is a Fellow of the IEEE and a Distinguished Lecturer of the IEEE Power Electronic Society (PELS), and has over 30 years of both industry and research experience in the fields of power electronics and energy. He has served both the IEEE Power Electronics and Industrial Electronics Societies in numerous roles, relating to editorial, conference, technical committee and chapter activities. Currently, Udaya is an Associate Editor for IEEE Transactions on Power Electronics, and a member of both the Administrative Committee and Membership Development Committee of the IEEE Power Electronics Society. He was the General Chair of the 2nd IEEE Southern Power Electronics Conference (SPEC)- 2016, held in New Zealand, and is also the Chair of SPEC Steering Committee. Udaya, who has over 300 IEEE and IET journal and conference publications, holds a number of patents related to wireless power transfer (WPT) and power converters, and is a consultant to industry.

# KEYNOTE SPEAKER

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**Prof. Changyun Wen, IEEE Fellow**

**Nanyang Technological University, Singapore**

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**Bio:** Changyun Wen received his B.Eng from Xi'an Jiaotong University, China in July 1983 and Ph.D from the University of Newcastle, Australia in Feb 1990. From August 1989 to August 1991, he was a Research Associate and then Postdoctoral Fellow at the University of Adelaide, Australia. Then he joined the School of Electrical and Electronic Engineering at Nanyang Technological University (NTU) as a lecturer. He was promoted to Full Professor through the first Promotion and Tenure Review Exercise at NTU in 2008.

He is an Associate Editor of a number of journals including Automatica, IEEE Transactions on Industrial Electronics and IEEE Control Systems Magazine. He is the Executive Editor-in-Chief, Journal of Control and Decision. He also served the IEEE Transactions on Automatic Control as an Associate Editor from January 2000 to December 2002. He has been actively involved in organizing international conferences playing the roles of General Chair, General Co-Chair, Technical Program Committee Chair, Program Committee Member, General Advisor, Publicity Chair and so on. He was awarded the IES Prestigious Engineering Achievement Award 2005 by the Institution of Engineers, Singapore (IES) in 2005. He received the Best Paper Award of IEEE Transactions on Industrial Electronics in 2017.

His main research activities are in the areas of adaptive control, intelligent power management system for more electric aircraft, modelling and control of active chilled beam for HVAC systems, switching and impulsive systems, model based online learning, system identification, control and synchronization of complex systems and networks, smart grids, cyber-physical systems, biomedical signal processing and biomedical control systems.

He is a Fellow of IEEE, was a Member of the IEEE Fellow Committee from Jan 2011 to Dec 2013 and a Distinguished Lecturer of IEEE Control Systems Society from Feb 2010 to Feb 2013.

# KEYNOTE SPEAKER

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**Prof. Dennis Leung**

**The University of Hong Kong, Hong Kong**

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**Speech Title:** Applications of low grade and waste aluminum for powering portable devices and sensors

**Abstract:** Aluminum-air (Al-air) battery has been invented for more than 50 years, which is well-known for its high energy density and excellent power output. Nevertheless, the application of this technology is still restricted to large-systems with high cost due to its complexity, while its application in portable devices is barely reported. This is because of its requirement of high-purity Al anode and complex electrolyte management, which lead to poor market competitiveness and system redundancy. Inspired by the ever-growing research on paper-based power sources, in this work a novel-type Al-air battery has been developed to bring this conventional technology to the enormous miniwatt market potential. By using cellulose paper as electrolyte channel, the whole system is greatly simplified without the need for bulky liquid storage or active electrolyte delivery. Hydrogen generation is also suppressed. More importantly, the restricted electrolyte transport and ion diffusion inside the porous and tortuous paper enables the direct utilization of low-purity Al (<98%) in alkaline electrolyte with a high specific capacity of 1732 mA h g<sup>-1</sup>. Furthermore, the intrinsic flexibility and printability of paper have enabled the fabrication of flexible and printable Al-air batteries, which are more lightweight and versatile. This printable battery design directly employs Al ink and Oxidation Reduction Reaction (ORR) ink for anode and cathode fabrication, respectively. This novel design exhibits a great development potential for a much smarter and more economic battery application prospect for the emerging miniwatt market such as wearable electronics, point-of-care diagnostic assays, biosensors, smart packages, etc. In this talk, the above innovative batteries will be introduced and demonstrated.

**Bio:** Prof. Dennis Y.C. Leung received his BEng (1982) and PhD (1988) from the Department of Mechanical Engineering at the University of Hong Kong. He had worked with the Hongkong Electric Co., Ltd. for five years heading the air pollution section of the company before joining the University of Hong Kong in 1993. Professor Leung is now a full professor and associate head of the Department of Mechanical Engineering specializing in environmental pollution control and renewable & clean energy development. He has published more than 450 articles in this area including 280+ peer reviewed top SCI journal papers. His current h-index is 65 and total citations are more than 23000 according to Goggle. He is one of the top 1% highly cited scientists in the world in energy field since 2010 (Essential Science Indicators) and named as a Highly Cited Researcher by Clarivate Analytics in 2017 and 2018. Prof. Leung has delivered more than 60 keynote and invited speeches in many international conferences as well as public lectures.

# **KEYNOTE SPEAKER**

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**March 8, 2020**

## **Session 1**

### **Power Systems and Smart Grids**

**⌚ 13:30-15:45**

**📍 SR706 (Seventh floor)**

Chaired by

#### **9 Presentations—**

G2-1001, G2-002, G1-057, G1-027

G1-031, G1-034, G1-050, G1-053, G1-022

#### **\*Note:**

- Please arrive 30 minutes ahead of the session to prepare and test your PowerPoint.
- Certificate of Presentation will be awarded to each presenter by the session chair when the session is over.
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- Please keep all your belongings at any time!

# SESSION 1

G2-1001 13:30-13:45	<p>Identifying inrush currents based on Bayesian recursive algorithm for a numerical overcurrent protection relay <b>Anh V Nguyen</b> and Lien B Nguyen Hanoi University of Science and Technology Vietnam</p> <p>Abstract—The overcurrent relays are one of the most important devices on the electrical power system because they help to eliminate the abnormal currents. However, the relays sometimes cause nuisance trips when the circuit is starting because they fail to discriminate between the short-circuit current and the inrush current. This paper introduces a new principle of discrimination between inrush currents and short-circuit currents based on Bayesian recursive algorithm. Information about the abnormal current patterns as well as the instance of the event can be represented in terms of probability density functions, Bayesian rules help combine the probability information to find the most probable prediction about the current states. Experiment results demonstrate that this method is effective and helps the relay avoid nuisance tripping of short-circuit protection.</p>
G1-002 13:45-14:00	<p>A Comparative Analysis of Processes of Conceptual Change for the Enhancement of Implementation of Green Energy Education and Training <b>Andreas Ahrens</b>, Christoph Lange, Jelena Zaščerinska and Ludmila Ałeksejewa Hochschule Wismar, Germany</p> <p>Abstract—Green energy is promoted via education and training. In education, concepts are the cornerstone in knowledge creation. Comparative analysis in the present paper assists in the discovery of patterns of processes of conceptual change. The aim of this paper is to compare processes of conceptual change underpinning the enhancement of implementation of green energy education and training. Our motivation here is to identify an efficient process of conceptual change for the enhancement of implementation of green energy education and training. The novelty of the research presented in this paper lies in the formulated implications for research and practice devoted to the efficient implementation of green energy education and training.</p>
G1-057 14:00-14:15	<p>Identification of power demand characteristics for each area and energy saving control selection method <b>Toshihiro Mega</b>, Yusuke Fujiwara, Masatada Kawatsu and Noriyuki Kushiro Kyushu Institute of Technology, Japan</p> <p>Abstract—Demand response (DR), which aims to stabilize power supply and cost of electricity, has garnered considerable research interest in recent years. It is expected to be particularly useful in small and medium-sized office buildings, which are responsible for a large share of the total electricity consumption of an area. In this paper, we propose a method for identification of power demand characteristics for each unit, floor, and area based on a power consumption prediction model developed using heterogeneous mixture learning technology. With experimental data obtained from an eight-story office building, we develop an energy-saving control selection method for DR based on the identified power demand characteristics and our evaluation results are reported herein.</p>

# SESSION 1

G1-027 14:15-14:30	<p>A Control Strategy for Suppressing the DC Overvoltage under the Fault of DC Power Grid Shanshan Wang, Yuetong Zhao, Bing Zhao, Tiezhu Wang, Guanglu Wu, Yingbiao Li, Xiao Yu, Yuanyuan Sun, Rui Yin, Shanmeng Qin and <b>Yue Hua</b> Shandong University, China</p> <p>Abstract—Unbalanced power in DC power grid causes DC overvoltage, which damages the capacitors, IGBT and other devices, so it is essentially important to suppress the DC overvoltage. Aiming at the problem of DC overvoltage suppression, this paper proposes a new control strategy to suppress the rise of DC voltage by adding DC voltage signal to traditional constant AC voltage controller. Firstly, the mechanism of DC overvoltage is studied, and the relationship between the DC voltage and the unbalanced power in DC power grid is qualitatively and quantitatively analyzed according to the law of energy conservation. Then the relationship between the DC voltage and AC voltage is obtained, and an additional DC voltage control strategy is proposed for constant AC voltage control to suppress the rise of DC voltage. Based on the PSCAD/EMTDC, the simulation model of four terminal VSC-HVDC is built. In the case of blocking fault at the receiving end, the effectiveness of the proposed control strategy is verified.</p>
G1-031 14:30-14:45	<p>Optimal Planning of Distributed Generators and Loads in Active Distribution Network: A Review Shichuan Wang, <b>Yuanyuan Sun</b>, Kejun Li, Lisheng Li, Yang Liu and Linli Zhang. Shandong University, China.</p> <p>Abstract—The integration of distributed generation and loads (DGL), which are composed of distributed generation (DG), energy storage system (ESS) and electric vehicles (EVs) in power distribution networks (DN), has become increasingly important in recent years. In this paper, the optimal allocation of DGL under the background of active distribution network (ADN) is summarized. Firstly, this paper presents an overview of this research field and the main research methods. Then, the optimal planning problem and the modeling of DGL are stated. After that, the most innovative contributions in reviewed works are analyzed and classified. And finally, the future research directions are prospected.</p>
G1-034 14:45-15:00	<p>Achieving Robust and Accurate Power Distribution Grid Damage Forecasting via a Two-Stage Forecasting Method Seongmun Oh, <b>Yejin Yang</b>, Jaesung Jung and Min-Hee Choi Ajou University, R.O. Korea</p> <p>Abstract—This paper presents a method to forecast storm-induced power distribution grid damage. Three sets of historical data are used: storm data, local weather data, and power distribution grid damage data from January 2008 to March 2018. Before developing the damage forecasting method, the key explanatory variables are identified by using stepwise regression analysis to develop a simpler and robust forecasting model. Thereafter, this paper proposes a two-stage damage forecasting method. Random Forest (RF) and feed-forward neural network (FFNN) model are used for forecasting grid damages. RF is used to classify the no damage and damage cases before the damage forecasting and then FFNN is used to forecast the number of grid damages only for the damage cases. The actual storm event data is</p>

# SESSION 1

	used to verify the proposed method by using Mean Absolute Error (MAE).
G1-050 15:00-15:15	<p>Renewable Energy Intermittency Mitigation in Microgrids: State-of-the-art and future prospects</p> <p><b>Aqsa Naeem</b>, Naveed Ul Hassan and Naveed Arshad Lahore University of Management Sciences (LUMS), Pakistan</p> <p>Abstract—The use of Renewable Energy Sources (RES) in Microgrids (MG) for power generation is a much-proposed countermeasure against the environmental degradation caused by burning of fossil fuels. However, RES are intermittent in nature and the power generated by them fluctuates randomly, due to which, appropriate measures are needed to ensure an efficient and reliable power supply. This paper reviews the state-of-the-art techniques used to mitigate the intermittency of RES in MG. A new classification of intermittency mitigation techniques is presented and a comparison of these techniques is drawn. Based on the reviewed literature, some important research directions to improve the existing intermittency mitigation techniques are proposed. Among these directions, the need to investigate RES complementarity further by characterizing RES, minimization of the cost of energy storage systems (ESS) and development of algorithms for better integration, management and control of ESS and dispatchable generators have been identified as crucial challenges in mitigating the intermittency of RES in MG. In addition, the standardization of communication protocols to ensure interoperability of communicating elements of MG and the use of fast, reliable communication links have been realized as fundamental requirements for a MG to be able to mitigate intermittency through appropriate techniques, such as, energy cooperation between MG and demand response management.</p>
G1-053 15:15-15:30	<p>Research on the influence of different types distributed power supply on distribution network voltage</p> <p>Xiao Ying, Chang Xiao, Zhang Shifeng, Shi Yuxin, Zhao Jun and <b>Liu Liqun</b> State grid Shanxi electric power company, China</p> <p>Abstract—High-permeability distributed power (DG) access to the distribution network has become the latest trend in the development of renewable energy, which has led to some questions, such as the changes in distribution network voltage, complex power flow calculation, difficult protection, and increased harmonics, which are more complex and random as compare with the conventional distribution networks, and affect the reliability of the distribution networks. This article starts from the perspective of the impact of different types of DG access to the distribution network on the node voltage. Based on the standard IEEE33 node distribution network, specific examples are used to compare the effects of different types on the distribution network. The simulation results show that the role of the node voltage of different types' DG in the distribution network is very different. When protecting the DG access to the distribution network, it is necessary to consider the type of DG.</p>
G1-022 15:30-15:45	<p>The three-port three-phase 3L-NPC isolated bidirectional DC-DC converter</p> <p><b>Chongwu Wang</b>, Sheng Cao, Wenlun Cao and Junfeng Chen The northern polytechnical university, China</p>

# SESSION 1

Abstract—The multiport 3 level neural point clamped (3L-NPC) isolated bidirectional DC-DC converter (IBDC) can double the voltage level using the standard switching devices and connects different type sources together to meet the high-power application such as the ROV systems. A kind transformer coupled three-phase three-port 3L-NPC IBDC was put forward in this paper, and two operation modes were analyzed in detail according to the phase shift ratio and the duty cycle relationship. The regulating strategy of power flow for the three-port 3L-NPC IBDC was to get the minimum loss, hence the zero averaged power in the storage port and/or the zero-power flow between the storage port and load port were applied. The control was the multi-loop negative feedback of output voltage and current at the load port and a single-loop feedback of output current at the storage port. The linearization small signal mode was set up to analyze the control property and to determine the parameters. The three-port 3L-NPC IDBC can improve the electromagnetic compatibility obviously for high-power high-voltage application.

# **SESSION 2**

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**March 8, 2020**

## **Session 2**

### **Machine Learning and Intelligent Computing**

**⌚ 13:30-15:45**

**ଓ LT301 (Third floor)**

Chaired by

#### **9 Presentations—**

G2-1003, G1-011, G1-016, G1-017

G1-024, G1-026-A, G1-028, G1-007, G1-025

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# SESSION 2

G2-1003 13:30-13:45	<p>Evaluation and Visualization of kW / kWh Cost of a District Heating and Cooling System for Electricity Adjustment <b>Kohei Tomita</b>, Yasuhiro Hayashi, Yutaka Iino, Yuto Yamamoto and Kosuke Kobayashi Waseda University, Japan</p> <p>Abstract—A District Heating and Cooling system (DHC) with Combined Heat and Power (CHP) is able to not only satisfy regional heat and cold demand but also generate and control electricity by CHP. Therefore, a DHC with CHP has potential as control reserve for electricity adjustment (EA). In Japan, an EA auction was established to secure control reserve efficiently. In our previous research, potential of EA by a DHC for this auction has already evaluated. Furthermore, it was found that kW and kWh costs of a DHC for EA mainly depend on the heat and cold demand. Operators of DHCs need to comprehend the exact costs for EA when they bid on the auction. Therefore, fluctuations in costs for EA due to changes in heat and cold demand have been a critical issue for operators in decision making for the bid. However, costs for EA of a DHC with comprehensive assumption of various heat and cold demands has not been evaluated. Therefore, in this paper, the kW and kWh costs of an existing DHC are quantified and visualized as a multidimensional function based on the conditions of heat and cold demands. In addition, the factors behind those results are discussed. As a result, this research made it possible to predict the costs for EA of the DHC with heat and cold demand forecasts, and the operator could use it as auxiliary information in decision making for the bid.</p>
G1-011 13:45-14:00	<p>Design and analysis of diffuser casings of diffuser augmented wind turbines <b>Surya S</b>, Ashwini Anand Gaonkar and <b>Jayakrishnan Radhakrishnan</b> Manipal Institute of Technology, India</p> <p>Abstract—Diffuser Augmented Wind Turbines (DAWTs) are an efficient method of harnessing wind power compared to conventional wind turbines. This article mainly focuses on the design and analysis of diffuser casing of various with various design parameters. Reynolds Averaged Navier Stokes equations in conjunction with k-<math>\omega</math> SST turbulence model was used to analyze the flow pattern and properties through the diffuser casing. The modelling of diffuser was done in CATIA and all CFD analysis was performed on ANSYS FLUENT.</p>
G1-016 14:00-14:15	<p>Condition Evaluation of Dry-type Transformer Based on High-dimensional Random Matrix Theory <b>Yue Hua</b>, Yuanyuan Sun, Yiru Hu, Lina Zhang, Na Li and Shuo Ma Shandong University, China</p> <p>Abstract—Epoxy dry-type transformer plays a key role in the offshore oil platform power system. The normal operation of dry-type transformers faces many challenges, mainly due to the long maintenance period, high reliability requirements and complex offshore power requirements. At the same time, the offshore power system has formed a big data environment. In this context of power system, big data analysis methods are urgently needed. Based on the high-dimensional random matrix theory, this paper firstly considers various factors which have influence on the state of dry-type transformers to construct a condition</p>

# SESSION 2

	<p>evaluation matrix, and then analyzes the eigenvalue distribution of the condition evaluation matrix which was formed by time series data. In order to reflect changes in eigenvalue distribution, the mean spectral radius (MSR) was introduced. Through it, we can find the trend of key performance changes, and detect abnormalities in key performance of equipment in time. Finally, the effectiveness of the proposed method is illustrated by an example.</p>
G1-017 14:15-14:30	<p>A Probabilistic Load Flow Method based on Improved Point Estimate and Maximum Entropy  <b>Qingyan Wang</b>, Yuanyuan Sun, Xiangmin Xie, Kaiqiang Cheng, Yahui Li and Peng An  Shandong University, China.</p> <p>Abstract—New devices such as wind turbine and photovoltaic connecting to the power grid bring uncertain features to the modern power system. The uncertain factors have a significant impact on the operating state and harmonic level of power system. To analyze the influence of the uncertain factors, a novel probabilistic power flow method combined the improved point estimate and maximum entropy theory is proposed in this paper. To relieve the calculation burden, the estimated points are first calculated in the standard normal distribution space. Through the transformation from standard normal probability distribution space to the original probability distribution space, the raw moments can be easily calculated. Then according to the raw moments of output variables, the probability distribution of output variables can be reconstructed through maximum entropy theory. The proposed method can effectively analyze the fundamental and harmonic state of the power system. The superiority of the proposed method is validated by the simulation with the IEEE 33 bus distribution system.</p>
G1-024 14:30-14:45	<p>A Novel DC Voltage Control Strategy for DC Distribution Based on Adaptive Droop Control  Xianxu Huo, <b>Xingfeng Xie</b>, Zaijun Wu and Xiaoyong Cao  Southeast University, China</p> <p>Abstract—The stability of the DC voltage is one of the key technologies needed to be solved in the medium voltage DC distribution system (MVDCDS). Therefore, this paper proposes a novel master-slave control strategy based on the proposed adaptive droop control of the voltage source converter (VSC). According to this strategy, the master station operates in constant DC voltage mode as a reference of voltage and other slave stations adopt adaptive droop control with the dead band. When MVDCDS operates in steady-state, the slave stations output constant power to track the setting values, but if MVDCDS suffers from the larger disturbance, the slave stations can automatically switch to the adaptive droop control to rapidly regulate the DC voltage, so that the DC voltage does not overstep its limits. A two-terminal DC distribution system model is established by MATLAB/Simulink to verify the effectiveness of the proposed control strategy.</p>
G1-026-A 14:45-15:00	<p>Generation of Eleven-Level Output Voltage from Cascaded Multilevel Inverter Consisting of Three H-Bridge Units Connected to Unequal dc Sources  <b>Tapan Kumar Chakraborty</b>, Ashique Anan Abir and Md. Imran Prodhan  University of Asia Pacific, Bangladesh</p> <p>Abstract—Recently, different topologies of cascaded multilevel inverters are being widely investigated due to their industrial applications in many fields. A cascaded multilevel inverter circuit is implemented by connecting several H-bridge units in series to obtain a desired</p>

# SESSION 2

	<p>output voltage consisting of several voltage steps. In most of the cascaded multilevel inverters, dc sources with different values are connected to individual H-bridge unit. However, in few cases of the cascaded multilevel inverters, equal independent dc sources are connected to individual H-bridge unit. This paper introduces an implementation of single-phase multilevel inverter to generate eleven-level output voltage using cascaded three H-bridge units. Four power semiconductor MOSFET switches have been used for each H-bridge unit. Three unequal independent dc sources have been connected to three H-bridge unit. The gate drive signals for twelve MOSFETs of the three H-bridge units connected in series to control the switching states have been generated using ATmega 2560 microcontroller-based Arduino board. The complication of generating gate drive signals for MOSFETs has been simplified for multilevel inverter by writing simple programming codes for the microcontroller. Twelve pins of the Arduino board have been programmed in output mode for generating gate drive signals using simple algorithm. It is observed that less number of power semiconductor devices are used to obtain eleven levels on the output voltage of the proposed system. This study also shows that total harmonic distortion of the output voltage of the proposed inverter has been reduced with increasing number of voltage levels. The proposed system was experimentally tested in the laboratory. It is found that the proposed system accurately generates the gate signals for controlling the switching on/off state of semiconductor switches and there is an improvement in the total harmonic distortion of the output voltage across the load. However, the output voltage of the multilevel inverter consists of switching spikes which may be reduced by selecting proper power switching devices with low turn-off and turn-on times.</p>
G1-028 15:00-15:15	<p>Optimal Grid Reconfiguration Algorithm for Improving System Resilience under Extreme Weather Events</p> <p><b>Victor Widiputra</b> and Jaesung Jung</p> <p>Ajou University, South Korea</p> <p>Abstract—Due to global warming, the number of extreme weather events has increased in the last ten years. Consequently, the number of power system blackouts has also increased in this period. The reliability index is incapable of analyzing the power system behavior during these events because it does not account for extreme weather events for its calculation. Therefore, the resilience index is proposed for measuring the system functionality during extreme weather events. To increase the resilience value of the system, its functionality during such events must be increased. One way to achieve this is through the reconfiguration of the power system, to ensure that the parts of the power system which do not experience failure remain operational even during the extreme weather events. This paper proposes an algorithm to determine the optimal reconfiguration of the power system to increase the grid resilience. First, it applies the actual condition of the system during the extreme weather events. Then, the algorithm finds the islanded buses in the power system using bus injection to bus current (BIBC) matrix. Finally, the algorithm utilizes a genetic algorithm to find the optimal reconfiguration for the system. The results show that the reconfiguration strategy can be utilized to increase the system resilience under similar extreme weather events.</p>
G1-007 15:15-15:30	<p>A PHET Dispatching Method Considering Customer Demand and Charging Resources</p> <p><b>Xushan Qing</b>, Xiangzhou Luo and Huimiao Chen</p>

# SESSION 2

	<p>University of Electronic Science and Technology of China, China</p> <p>Abstract—Plug-in electrical vehicles (PEVs) play a significant role in environment protection and attract global attentions. However, with the popularization of PEVs, low-efficiency supporting facilities such as the charging system impede its future development. To improve the charging system, we focus on plug-in hybrid electric taxis (PHETs) as they are the main users of public charging system. In this paper, we first predict the order numbers and mileage consumption of orders with the help of convolutional neural networks (CNNs). We then divide the area in 30 groups using K-means method and plan the charging capacity of station in each area. Two coordinated dispatching and charging strategies are proposed considering the states of charge (SOCs) at vehicle level and considering the real-time effect at region level, respectively. Finally, we test the dispatching effect using order car ratio (OCR) models at region level. The results show that it works quite well when testing on the real dataset. This method provides optimal instructions for PHETs to pick orders, satisfy their charging demand and also meet the order demands for taxis.</p>
G1-025 15:30-15:45	<p>Stochastic Distribution Expansion Planning with Wind Power Generation and Electric Vehicles Considering Carbon Emissions</p> <p><b>Vivienne Hui Fan</b>, Ke Meng, Jing Qiu and Zhaoyang Dong</p> <p>University of New South Wales, Australia</p> <p>Abstract—Conventional power distribution system is evolving with the growth of distributed generation and electric vehicle integration. The methods of this multidisciplinary integration under uncertainty have not yet been closely examined. In this work, we propose a framework for distribution network expansion planning considering the stochastic nature of DGs, charging stations and the associated carbon impact. The proposed model aims to minimize the overall investment cost, the operation and maintenance cost, energy losses and carbon emissions by optimizing the location and sizes of alternative feeders, the reinforcement of existing substations and new constructions, and the deployment of DGs and charging stations. A multiobjective mixed-integer nonlinear programme is formulated and recast as a two-stage stochastic problem based on analytical probabilistic approach. The model is solved with Tchebycheff decomposition method based evolutionary algorithm. The proposed approach is examined against a modified case 54 distribution and node 25 transportation system. Sensitivity analysis proves the overall investment cost could be substantially affected by carbon emissions by 21%. System cost and energy loss can be reduced by 1.5% by integrating wind generators. Numerical results obtained effectively demonstrate the capability and feasibility of proposed method.</p>

# **SESSION 3**

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**March 8, 2020**

## **Session 3**

### **Electronics and Energy Engineering**

**⌚ 16:00-18:15  
ଓঁ SR706 (Seventh floor)**

Chaired by

#### **9Presentations—**

G1-014, G1-029, G1-049, G1-058

G1-032, G1-047, G1-048, G1-054, G1-055

#### **\*Note:**

- Please arrive 30 minutes ahead of the session to prepare and test your PowerPoint.
- Certificate of Presentation will be awarded to each presenter by the session chair when the session is over.
- One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded when the session is over.
- Please keep all your belongings at any time!

# SESSION 3

G1-014 16:00-16:15	<p>Modeling and Analysis of Compound Aggregation of Household Load Groups Participating in Demand Side Response <b>Jiao Xiaoquan</b> and Xu Qingshan Southeast University, China</p> <p>Abstract—In order to ensure the stable operation of the household power system, a comprehensive aggregation model of the household load group participating in the demand side response is proposed. According to the principle of participating in the demand side response, operation parameters of the household power system are collected and the corresponding values of household load groups are calculated. Based on the calculated composite values, the polymerization process at night is processed. Then the aggregation process is optimized, and a fast aggregation decision tree is established accordingly. The aggregation model based on potential assessment is established according to electricity consumption habits of users and operating characteristics of equipment. The experiment shows that the load response performance of the research method can be better. The user satisfaction is over 90%, the load scheduling time is less than 1.8s, and the daily power consumption of the family can be reduced. This proves that the comprehensive performance of the method can be better and the application effect can be more ideal.</p>
G1-029 16:15-16:30	<p>Operator-oriented Peer-to-peer Energy Trading among Residential Customers in South Korea <b>Kangjoon Heo</b> and Jaesung Jung Ajou University, South Korea</p> <p>Abstract—This paper proposes a peer-to-peer (P2P) energy trade operating methodology in a community that comprises several residential customers. Unlike previous studies on P2P energy trading, this paper suggests an operator-oriented trading scheme to solve a social welfare maximization problem by using the block rate price (BRP). Under this scheme, the operator, rather than each of the participants, decides the trading price and schedules. For this scenario, a price model and a social welfare problem were formulated. The former aims at a fair profit distribution between sellers and buyers, and the latter targets maximizing the community's total profit. The results are verified using a case study on a community consisting of residential customers in South Korea who adapted the BRP.</p>
G1-049 16:30-16:45	<p>Design of Solar-Wind Hybrid Power System by using Solar-Wind Complementarity <b>Aqsa Naeem</b>, Naveed Ul Hassan and Naveed Arshad Lahore University of Management Sciences (LUMS), Pakistan</p> <p>Abstract—Environmental degradation is a rapidly growing concern across the globe, which is primarily caused by conventional fossil fuels-based power generation. This study examines the feasibility of generating electricity by using renewable energy sources (RESs) based hybrid power system (HPS). A general planning framework for integrating solar and wind energies in a HPS is proposed, that exploits the solar-wind complementarity to stabilize the combined power output. Specifically, it evaluates the solar-wind complementarity by using Pearson's correlation coefficient, and determines the optimal shares of solar-wind energies in power generation by minimizing the standard deviation of HPS power output. The proposed</p>

# SESSION 3

	<p>framework is evaluated on a case study in Pakistan, where sufficient solar-wind synergy potential exists. Our results show that values of solar-wind complementarity vary considerably from -0.351 (high complementarity) to 0.411 (low complementarity). It is observed that by using optimized shares, HPS power outputs exhibit less variations than the outputs generated by standalone solar or wind energy-based power systems. Best location for deployment of solar-wind HPS is identified as the one that maximizes the solar-wind complementarity benefits.</p>
G1-032 16:45-17:00	<p>Construction of a preliminary educational system for fuel cell using hydrogen  <b>Nobuharu Okamitsu</b>, Kenshi Nishino, Faye Duncan and Takeshi Tanaka  Hiroshima Institute of Technology, Japan</p> <p>Abstract—Global warming problems, local energy problems, etc. are expected to become serious problems as the aging society in Japan progresses. In addition, the introduction of renewable energy is important not only for measures against global warming, but also from the viewpoints of securing energy security, building independent and distributed energy systems, creating new industries and jobs. In this research, we constructed a preliminary educational system that can confirm the operation of hydrogen sensor, water electrolysis, LED lighting using fuel cell and so on. In addition, examples of fuel cells, microgrids, and Rankine cycles provided by Mathworks were introduced, and future hydrogen-related facilities were introduced.</p>
G1-047 17:00-17:15	<p>Tool Wear of (Al,Cr,W)/(Al,Cr,W,Si)-based-coated Cemented Carbide Tools in Cutting of Hardened Steel  Tadahiro Wada, <b>Akiyoshi Nitta</b> and Junsuke Fujiwara  National Institute of Technology, Japan</p> <p>Abstract—In this study, a carbonitride coating film was deposited on a cemented carbide ISO K10 using three different Al-Cr-W-Si targets. The coating film structure consists of mono-layer film and multi-layer films. The hardened steel ASTM D2 was cut with five types of coated cemented carbide tools. The tool wear of the coated tools was experimentally investigated. The following results were obtained: (1) Comparing the wear progress of the (Al53,Cr23,W14,Si10)(C,N)-and (Al58,Cr25,W7,Si10)(C,N)-coated tool, the wear progress of the (Al58,Cr25,W7,Si10)(C,N)-coated tool is slightly slower than that of the (Al53,Cr23,W14,Si10)(C,N)-coated tool. (2) Comparing the wear progress of the (Al60,Cr25,W15)(C,N)/(Al53,Cr23,W14,Si10)(C,N)-and the (Al53,Cr23,W14,Si10)(C,N)/(Al58,Cr25,W7,Si10)(C,N)-coated tool, the wear progress of the (Al53,Cr23,W14,Si10)(C,N)/(Al58,Cr25,W7,Si10)(C,N)-coated tool is slightly slower than that of the (Al60,Cr25,W15)(C,N)/(Al53,Cr23,W14,Si10)(C,N)-coated tool.</p>
G1-048 17:15-17:30	<p>A New Six-Phase FSCW Layout for Permanent Magnet Synchronous Wind Generators  Ayman Abdel-Khalik, <b>Ahmed Abu Elanien</b>, Ahmed Massoud, and Shehab Ahmed  Dhofar University, Oman</p> <p>Abstract—This paper proposes a new non-overlapped six-phase Fractional Slot Concentrated Winding (FSCW) layout for a Permanent Magnet (PM) synchronous wind generator with an outer rotor and surface mounted magnets. The proposed FSCW layout is originally an</p>

# SESSION 3

	<p>asymmetrical nine-phase winding where the nine phases are connected with a special connection as to provide an equivalent stator winding with six terminals only. The proposed winding successfully offers a high torque and voltage qualities with a low cogging torque. Besides, the stator and rotor core losses are reduced when compared with a three-phase counterpart. Finally, the high phase order of the proposed generator provides a better fault tolerant generator design. A 100kW PM generator with an outer rotor based on the proposed winding layout is designed and simulated using 2D Finite Element Analysis (FEA).</p>
G1-054 17:30-17:45	<p>A Novel Fuzzy based Intelligent Demand Side Management for Automated Load Scheduling  <b>Dhairya Karna</b>, Aditya Vikram, Astitva Kumar and Mohammad Rizwan  Delhi Technological University, India</p> <p>Abstract—Developments in smart-grid technologies can be associated with rising awareness among general populace of renewable energy as well as the need of distributed generation via these sources. Improvement in efficiency of electrical energy from Renewable Sources (RS) can be achieved by collaborating advanced structures with intelligent metering technology. The smart meters along with the distributed generation sources are being widely used in smart grid applications. An intelligent energy management system is key to monitor and control the processes at consumer and supplier end. Thus, an intelligent system for various computation and procurements can be considered a part of smart-grid. It is within consideration that a part of the energy demand by the building is covered by this Intelligent Demand Management Structure (IDMS). The IDMS is an indispensable tool in order to guarantee greatest added value to the smart meter. The practical and theoretical integration and application of IDMS with the smart meter is presented in this article. The article proposes a novel algorithm based on fuzzy optimization logic employed to the intended system. Fuzzy Controller Logic (FCL) language was used to create the fuzzy rules while the execution was carried out in Python. The designed algorithm is tested in the real time with the load profile of a practical setup. The proposed FCL based algorithm saved a maximum of 17.12% energy in best cased scenarios.</p>
G1-055 17:45-18:00	<p>Experimental study on the thermal performance of a porous medium solar pond  <b>Liu Hongsheng</b>, Wu Dan, Xie MaoZhao and Sun Wence  Dalian University of Technology, China</p> <p>Abstract—Thermal performance of a porous medium solar pond is studied by the laboratory and outdoor experiments. The laboratory experiments are carried out to test the heat storage ability of varies porous materials. The outdoor contrast experiment between two mini solar ponds with a surface area of 2.4m×2.4m, bottom area of 1m×1m are conducted to analyze the thermal performance of the porous medium solar pond. Influences of the porous medium as well as a cover on the temperature distribution are discussed. Results show that the maximum temperature of solar pond increase by about 6°C due to the introduction of porous medium. Inspired by the principle of the porous medium solar pond, a tide-driven reservoir with heat collection pond and circulating storage pond is proposed to provide fresh seawater with moderate temperature for seaside marine park in winter.</p>

# **SESSION 4**

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**March 8, 2020**

## **Session 4**

### **Energy and Environmental Engineering**

**⌚ 16:00-18:15  
📍 LT301 (Third floor)**

Chaired by

#### **9 Presentations—**

G2-007, G1-006, G1-009, G1-019

G1-021, G1-002, G1-023, G1-033, G1-060

#### **\*Note:**

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# SESSION 4

	<p>Modelling a Solar Module and Tracing Maximum Power Point Under Variant Ambient Conditions  <b>Anup Shukla</b> and Jasdeep Kour          Indian Institute of Technology Jammu, India</p>
G2-007 16:00-16:15	<p>Abstract—This paper proposes the mathematical modelling of a photovoltaic module and works out on techniques for tracking and identifying the Maximum Power Point (MPP) related to a voltage value. The MPP is worked out by using a Perturb and Observe algorithm and then by Ant Colony Optimization technique. The simulation is done on MATLAB platform. The simulation outcomes prove better modelling results with lesser error to the values specified on the datasheet and to the results already reported in literature. Ant Colony Optimization algorithm discussed in the paper is quite consistent with the metaheuristic techniques and lesser modification is done to the algorithm to suit the current situation as already reported. This algorithm provides faster convergence and a steady output even under adverse situations like change in ambient temperature, change in solar insolation levels and even under partial shading conditions caused due to passing clouds or falling tree branches.</p>
G1-006 16:15-16:30	<p>Study Of Shale Gas Storage Mechanism And Gas In Place Calculations: New Sights  <b>Asadullah Memon</b> and Aifen Li          China University Of Petroleum (East China), China</p> <p>Abstract—For shale gas reservoirs, the combined study of adsorbed and absorbed gases provides a better description of gas storage mechanism and characterizes the original gas-in-place. Two shale samples were taken and a series of isothermal gas sorption, porosity and total organic carbon experiments were conducted. Then, gas sorption and stress equations were combined to evaluate the mechanism of gas storage by analyzing the effective porosity of sorbed gas. Absorbed gas is usually linked with adsorbed gas and about 22% is contributing in connection with total gas storage capacity but previous studies had ignored such gas in calculation of total gas storage capacity. Therefore, present study is considered the sorbed gas which is the combination of adsorbed and absorbed gases and presenting new sights to comprehend the gas storage mechanism and to characterize the shale gas-in-place. Results revealed from this study that sorption model is providing better descriptions than Langmuir model and close matched with experimental data. Analysis of effective porosity is important to depict the shale gas reservoirs. Shale gas-in-place was measured using different methods e.g. previous and new proposed method and observed that when using new proposed method the total gas storages were found higher at low pressure because of absorbed gas input as compare to previous methods. Further, the total gas storages capacity is increases further according to the adsorption and absorption behavior as pressure increases. This study presents sorbed gas mechanism and might be useful for characterizing the shale gas reservoirs.</p>
G1-009 16:30-16:45	<p>Biodiesel Production From Refined Rice Bran Oil Using Eggshell Waste As Catalyst Impregnated With Silver Nanoparticles  <b>Febrian Rizkianto</b>, Vinod K. Jindal, Ranjna Jindal, Romanee Thongdara, Masaki Takaoka and Kazuyuki Oshita          Mahidol University, Thailand</p>

# SESSION 4

	<p>Abstract—Biodiesel is a promising renewable fuel with many attractive features such as high combustion efficiency, biodegradability, and less toxic exhaust emission. This study investigated an environmentally friendly method for biodiesel production from refined rice bran oil (RRBO) using calcium oxide (CaO) from eggshell waste as a catalyst via transesterification reaction. A two-level three-factor full factorial experimental design was used to determine the effect of the impregnation of silver nanoparticles (AgNPs), calcination temperature and heating rate as independent variables on the biodiesel yield. Results showed that the calcination heating rate and the impregnation of AgNPs had significant effects on the biodiesel yield. An optimum biodiesel yield of about 92% was obtained using AgNPs impregnated CaO catalyst prepared from eggshell waste using a heating rate of 5oC/min during calcination at temperatures in 800-1000oC range.</p>
G1-019 16:45-17:00	<p>Comparison of Energy Efficiency and Carbon Dioxide Emissions of Gas Turbine Cogeneration with Steam Absorption Chillers versus Conventional Chilled Water Generation <b>Adzuieen Nordin</b>, Didi Asmara Salim, Shahrul Nahar Omar Kamal, Danny Tam and Mohd Kamarul Yusri Yusof Politeknik Ungku Omar, Malaysia</p> <p>Abstract—Malaysia government committed to reduce greenhouse gas emission by 45% by 2030. This target was set with 35% on unconditional basis and 10% on conditional basis upon receipt of climate finance funding, technology transfer and capacity building developed countries. This paper demonstrate how cogeneration district cooling power plant helped to mitigate greenhouse gas emission by comparing fuel efficiency and carbon dioxide emissions of the cogeneration district cooling plant and a conventional electrical chiller plant which electricity was imported from the power grid. The GT Pro simulation is used to estimate the efficiency and the carbon dioxide emissions from the power plant. Results and analyses indicate that the cogeneration district cooling plant consumed 30.47% less primary energy and emit 44.43% less of carbon dioxide as compared to the conventional power plant. Hence, the adoption of cogeneration district cooling plant will definitely help the nation goal to reduce greenhouse emission intensity by 35% to 45% by 2030.</p>
G1-021 17:00-17:15	<p>Hydraulic energy generation for RO (reverse osmosis) from PRO (pressure retarded osmosis) <b>Ivonne Tshuma</b>, Ralf Cord-Ruwisch and Wendell Ela Murdoch University, Australia</p> <p>Abstract—Although reverse osmosis (RO) is currently the most energy efficient, widely used, desalination technology, it still requires a great deal of energy to create the high pressure necessary to overcome the osmotic pressure of seawater. Pressure retarded osmosis (PRO), on the other hand, utilizes the salinity gradient between two solutions of different salt content to produce pressure, which can subsequently be used to generate electrical energy. The intended outcome of this study is a PRO-RO desalination system, where the PRO unit is directly hydraulically linked to a RO unit such that the pressure produced by PRO is transferred to RO to produce permeate. By utilizing the pressure produced in PRO to power RO, external energy inputs can be substituted. This is particularly significant in remote, off-grid, decentralized locations that have limited access to fresh water. The main objective of this paper is to introduce an RO driven by PRO technology and present ongoing work on a PRO stand-alone</p>

# SESSION 4

	process.
G1-002 17:15-17:30	<p>A Comparative Analysis of Processes of Conceptual Change for the Enhancement of Implementation of Green Energy Education and Training  <b>Andreas Ahrens, Christoph Lange, Jelena Zaščerinska and Ludmila Aleksejeva</b>  Hochschule Wismar, Germany</p> <p>Abstract—Green energy is promoted via education and training. In education, concepts are the cornerstone in knowledge creation. Comparative analysis in the present paper assists in the discovery of patterns of processes of conceptual change. The aim of this paper is to compare processes of conceptual change underpinning the enhancement of implementation of green energy education and training. Our motivation here is to identify an efficient process of conceptual change for the enhancement of implementation of green energy education and training. The novelty of the research presented in this paper lies in the formulated implications for research and practice devoted to the efficient implementation of green energy education and training.</p>
G1-023 17:30-17:45	<p>An Optimal Electrical Energy Management Scheme for Future Smart Homes  Sandali Walgama, Ushani Hasinthara, Anuri Herath, <b>Kalana Daranagama</b> and Sisil Kumarawadu  University of Moratuwa, Sri Lanka</p> <p>Abstract—The future trend in the energy sector is to have smart grid technologies that involve energy management schemes for domestic level consumers. This addresses the issue of increased energy consumption and the cost incurred in it. This project proposes a solution to optimize the energy consumption and to reduce the energy cost, based on an optimal electrical energy management scheme designed for future smart homes using a Home Energy Management System (HEMS). Domestic devices can be either real-time or schedulable according to user's preference and they are connected to a smart meter through a HEMS. An energy constraint has been considered based on future peak demands and an algorithm that will optimize the energy management of the appliances has been developed. The proposed scheme is a novel algorithm based on the Dijkstra algorithm with lower complexity. The main objectives of this scheme are optimization of electrical energy usage, energy cost minimization and minimum interference to users' preferences. Simulation results are presented to allow comparison of the performance of different existing algorithms and proposed scheme.</p>
G1-033 17:45-18:00	<p>Techno-Economic Assessment of Net Energy Metering Implementation for Rooftop Solar PV in a Commercial Building in Bangladesh  <b>Muhammad Ahad Rahman Miah</b>, Shaikh Rashedur Rahman and Runa Kabir  University Of Asia Pacific (Uap), Bangladesh</p> <p>Abstract—Net Energy Metering (NEM) involves to a mechanism that permits consumers to interconnect their distributed generation systems to the power grid network. NEM allows utility and consumer to mount a bi-directional meter to measure power flow in two directions—one from utility to consumer (import) and another from consumer to utility (export). The consumer's monthly consumption bill will be calculated based on the net energy measured by</p>

# SESSION 4

	<p>the meter i.e. energy drawn from the distribution grid minus the energy delivered to the distribution grid over the stated billing cycle. This study assesses the technical and economic potential and feasibility of net metering system implementation for a rooftop Solar Photovoltaic (PV) in a commercial building. It also analyzes the environmental impact reduction by implementing such renewable energy utilization project.</p>
G1-060 18:00-18:15	<p>Study on Environmental Health Aspect of Plastic Refinery in MASARO Cirebon Unit in Indonesia <b>Akhmad Zainal Abidin</b>, Najwa Shufia Choliq, Elsyeh Veradika Yemensia and Rizki Hastuti Bandung Institute of Technology, Indonesia</p> <p>Abstract—The main problems regarding waste management issue in Indonesia is the increasing volume and the rate of waste produced along with the increasing cost of handling, as well as the lack of attitude and behaviour of the people in managing waste. MASARO or Management Sampah Zero is a zero waste management system that offers the handling of waste until it is fully reduced to zero. One of the units in MASARO is plastic refinery, which handles plastic film waste and turns it into fuel. This refinery unit produce smoke and water as waste. A study is done in the aspect of environmental safety and health, focusing on the analysis of the smoke and the waste water. The analysis showed that all aspects from gas meet the environmental standar, but the height of the chimney need to be made higher for about 5 m. All aspects from waste water meet the environmental standard, except nitrate, phenol, and COD by potassium dichromate, which need to be treated afterwards using waste water treatment.</p>

# POSTER

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**January 13, 2020**

## **Poster Presentations**

**⌚ 10:30-10:50**

**📍 State Room (Ground Floor)**

### **10 Presentations—**

A1-015, A1-041-A, A2-004, A2-030, A1-052,  
A1-053, A1-054, A1-055, A1-061-A, A1-047

A1-015	<p>The Moderating Effects of Mentoring in ERP Systems <b>Su-Tzu Hsieh</b> Zhaoqing University, China</p> <p>Abstract- A failure implementation of enterprise resource planning, ERP System can be a disaster for organizations, as the fee of a ERP system is sky-high. Furthermore, a familiar user of an ERP system is required an exhaustive business knowledge to analysis business operation flows to diagnose and solve business problems. These complex business analysis, diagnose and issues solving may require mentoring rather than training of a particular skill. There is, however, only very limited research addresses to the effects of mentoring on ERP system implementation. This paper argues that mentoring can play an important role of moderating in affecting user's perceived usefulness, satisfaction and intention to continue use.</p>
A1-052	<p>Weak Sparsity Adaptive Matching Pursuit Algorithm based on Environmental Monitoring Sensor Network Data <b>Peipei Zhao, Xuewen Liu, Mingliang Li and Jiajing Ding</b> Hebei GEO University, China</p> <p>Abstract- Due to the undetermined signal sparsity in environmental monitoring applications, the compressed sensing reconstruction algorithm with sparsity adaptive characteristics has better application value. In order to improve the reconstruction accuracy of the reconstruction algorithm, this paper proposes a weak sparsity adaptive matching pursuit algorithm. Firstly,</p>

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	<p>the algorithm constructs the candidate set by weak selection, and then introduces the backtracking idea to filter the candidate set atoms and form a support set. In addition, the algorithm applies the idea of variable step size, and selects different step sizes for different iterations to achieve more accurate and complete reconstruction. Simulation experiments show that the improved algorithm proposed in this paper has higher reconstruction accuracy than similar algorithms.</p>
A1-041-A	<p>Continuous Use Behavior of Travel Booking App from the Perspective of User Perception: Second-order Construct Based on the Information System Quality <b>Xiaoke Yang</b>, Qiuhua Chen and Qian Chen Fujian Agriculture and Forestry University, China</p> <p>Abstract- The development of mobile internet has driven the rise of e-commerce. In several years, the cross-border integration of tourism and e-commerce has made the travel App have a large number of users. How to better analyze the use behavior of users and influence their continuous use behavior in a more “smart” form has become a major problem for App operators. In this study, practical problems of continuous use of travel booking App were analyzed. Based on the user perception control and ECM-ISC model, the second-order construct of information system quality was formed by the characteristics of travel booking App, and the continuous use behavior model of travel booking App was established. It is found that: (1) Information quality, system quality, and service quality constitute the second-order information system quality in the use process, which has an influence on user satisfaction, and promotes users to form continuous use willingness ; (2) The user's expectation confirmation has a positive influence on the continuous use willingness through satisfaction and perceived usefulness; (3) The user's continuous use willingness and contributing factors together has a positive influence on the continuous use behavior; (4) The self-efficacy perceived by the user has no significant influence on the continuous use willingness, indicating that the user has no perception control difficulty in terms of self-efficacy. The application of ECM-ISC model in practice is extended from the perspective of mobile marketing; The applicability of user perception control and information system quality in management practice model is enhanced; The micro-mechanism of continuous use behavior of travel booking App is revealed; And the marketing management suggestions are proposed for App operators from three dimensions of information system quality.</p>
A1-053	<p>WSN Signal Reconstruction Based on Unknown Sparse Compressed Sensing <b>Yanli Wang</b>, Xuewen Liu, Mingliang Li and Xueqing Li Hebei GEO University, China</p> <p>Abstract- For the signal reconstruction problem of unknown signal sparsity in compressed sensing, this paper proposes a Sparsity Adaptive Stagewise Orthogonal Matching Pursuit algorithm (SAOMP), which realizes the reconstructed signal under the condition of unknown signal sparsity. The algorithm combines the idea of adaptive thinking, variable step size iteration and piecewise orthogonal thinking. Under the condition of unknown signal sparsity, the number of supporting set atoms is adaptively selected, and finally the signal reconstruction is realized. The experimental results show that the proposed algorithm is better than the Orthogonal Matching Pursuit algorithm, the Regularized Orthogonal Matching Pursuit</p>

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	<p>algorithm and the Stagewise Orthogonal Matching Pursuit algorithm for the 128-bit observation set and the 256-bit length.</p>
A2-004	<p><b>A Transfer Learning Approach for Handwritten Numeral Digit Recognition</b>  <b>Le Zhang</b>          Hubei University, China</p> <p>Abstract- Handwritten numeral digit recognition is a classical problem in the field of computer vision, which has a wide range of applications in various fields including financial and post services. The accuracy of handwritten numeral digit recognition has been greatly improved by using deep learning in the past few years. However, deep learning relies on a large amount of training data and time-consuming calculation. In this paper, we adopt a transfer learning approach for handwritten numeral digit recognition and use both the multi-layer perceptron and convolutional neural network models to share the feature extraction process among five handwritten numerical datasets, namely, Tibetan, Arabic, Bangla, Devanagari, and Telugu. We compare the transfer learning scheme with the model based on a single dataset. We find that using the transfer learning method can significantly reduce the training time of the deep learning models, and slightly reduces the recognition accuracy.</p>
A2-030	<p><b>Safety Production Process Hazard Situation Analysis System Based on Large-scale Data Real-time Processing</b>  <b>Wenchi Du</b>, Niansong Zhang and Aimin Wang          Nanjing University of Science and Technology, China</p> <p>Abstract- In order to give full play to the effects of big data in production safety monitoring and to meet the purpose of upgrading the safety management of enterprises, reducing personnel and increasing efficiency, this paper designs and implements a dangerous situation analysis system for production safety based on real-time processing of large-scale data. The platform adopts a layered architecture design method, and is constructed based on security parameter monitoring and monitoring technology, large-scale real-time data processing technology, dangerous situation assessment system, knowledge base, and SPC process analysis and early warning technology. The platform mainly covers three types of data source systems: people, things, and environment. It has basic information management, dynamic monitoring, big data analysis, and intelligent early warning. The results show that the platform can collect and share a large amount of data on safe production, summarize the rules of accidents through a big data analysis model, and finally achieve fine management of the safety of dangerous goods production.</p>
A1-054	<p><b>Research on Security Location of Malicious Node Filtering for Environmental Monitoring Sensor Networks</b>  <b>Chaoyang Wang</b>, Mingliang Li, Xuewen Liu and Xuejiao Wu          Hebei GEO University, China</p> <p>Abstract- To solve the wireless sensor network node is difficult to find false data to filter out attack which led to the problem of positioning accuracy decline. Aiming at the reason that the traditional DV-HOP positioning algorithm is vulnerable, an improved DV-HOP algorithm is proposed. The algorithm can combine multiple communication radii to reduce the hop error of</p>

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	<p>the anchor node in communication with other nodes, and make the positioning more accurate by the hop-weighted hyperbolic algorithm. Further, consistency checking mechanism between packet information aggregator implemented filtering malicious nodes. The simulation results show that the improved DV-HOP algorithm has significantly higher positioning accuracy than the traditional DV-HOP algorithm under the condition that the detection mechanism filters malicious nodes.</p>
A1-061-A	<p>An Efficient Feature Extraction Approaches for Fatty liver Grade Classification using Ultrasound Images  <b>Moo Jung Seo</b> and Jae Chern Yoo  Sungkyunkwan University, Republic of Korea</p> <p>Abstract- Fatty liver is one of those diseases which can be detected by the relationship between the triglyceride of hepatocytes and the abnormal presence of other fats. Fatty liver can lead to liver cirrhosis in extreme conditions, resulting in permanent liver damage. However, this condition can be recovered if it is found at an early stage. Therefore, there is a high need of early diagnosis. Early diagnosis requires a highly efficient computer-aided design that allows you to diagnose fatty liver with minimal time. This study presents enhanced Gray Level Co-occurrence Matrix, an efficient method of functional extraction for identifying fatty liver tissue using B-scan ultrasound images. The technique proposed in this study is high effective when compared with the latest techniques proposed in previous studies. Proposed technique have improved the accuracy 6.05% compared to the conventional method.</p>
A1-055	<p>Research on Differential Particle Swarm Optimization Algorithm for Wireless Network Location in Seismic Exploration  <b>Xianhua Kong</b>, Junjian Kang, Mingliang Li and Jiting Li  Hebei GEO University, China</p> <p>Abstract- A novel hybrid optimization algorithm (DEPSO) is proposed for TDOA location and data security optimization problem in wireless network of 4G seismic exploration instrument based on the combination of the difference evolution algorithm (DE) and particle swarm optimization (PSO). Based on the DE, the algorithm is based on the neighborhood structure of cell topology, and avoids the injection of false information based on distributed compressed sensing technology. The novel algorithm which establishes the information sharing mechanism between the improved DE and the PSO can avoid to fall into local optimum and slow convergence problems. The simulation result shows that the improved algorithm improves the accuracy, robustness and data security, than the classical algorithm's so that it makes 4G seismic exploration instrument far more feasible and superior in practice than ever.</p>
A1-047	<p>Human capital and Their affect in service quality dimensions  <b>Mariam Ibrahim</b>, Azhara Aziz and Marwah Abdulkareem  University of kufa, Iraq</p> <p>Abstract- The purpose of this study is to investigate the effect of human capital components on quality of educational service through its dimensions. questionnaire were used to extract the components of human capital (HC) that affect the service quality dimensions. These</p>

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results were then tested using program SPSS, EXCEL. Each components of HC was then tested on the service quality (SQ) using correlation, regression coefficient. The analysis yielded five HC components, which were termed as Knowledge, Experience, skill, Innovation and Talent. It was found that all Knowledge, Experience, skill, Innovation and job-related talent significantly positively predict the SQ. The study offered experiential data to support the contention that university should develop and engage capabilities of lecturers to enhance the quality of educational service.

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