

# FRONT PAGE

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## ICPEA 2019

2019 IEEE 2nd International Conference on Power  
and Energy Applications

## ICSGE 2019

2019 2nd International Conference on Smart Grid  
and Energy

Singapore | April 27-30, 2019



**NANYANG  
TECHNOLOGICAL  
UNIVERSITY**  
SINGAPORE

Energy Research Institute @ NTU

ISSN: 2315-4462  
**SGCE**  
International Journal of Smart Grid and Clean Energy  
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# CONTENTS

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Venue.....	1
General Agenda at a Glance.....	3
Welcome Address.....	11
Introduction of Keynote Speakers.....	12
Session I.....	
Session II.....	
Session III.....	
Session IV.....	
Session V.....	
Session VI.....	
Session VII.....	
Session VIII.....	
Poster.....	

# VENUE

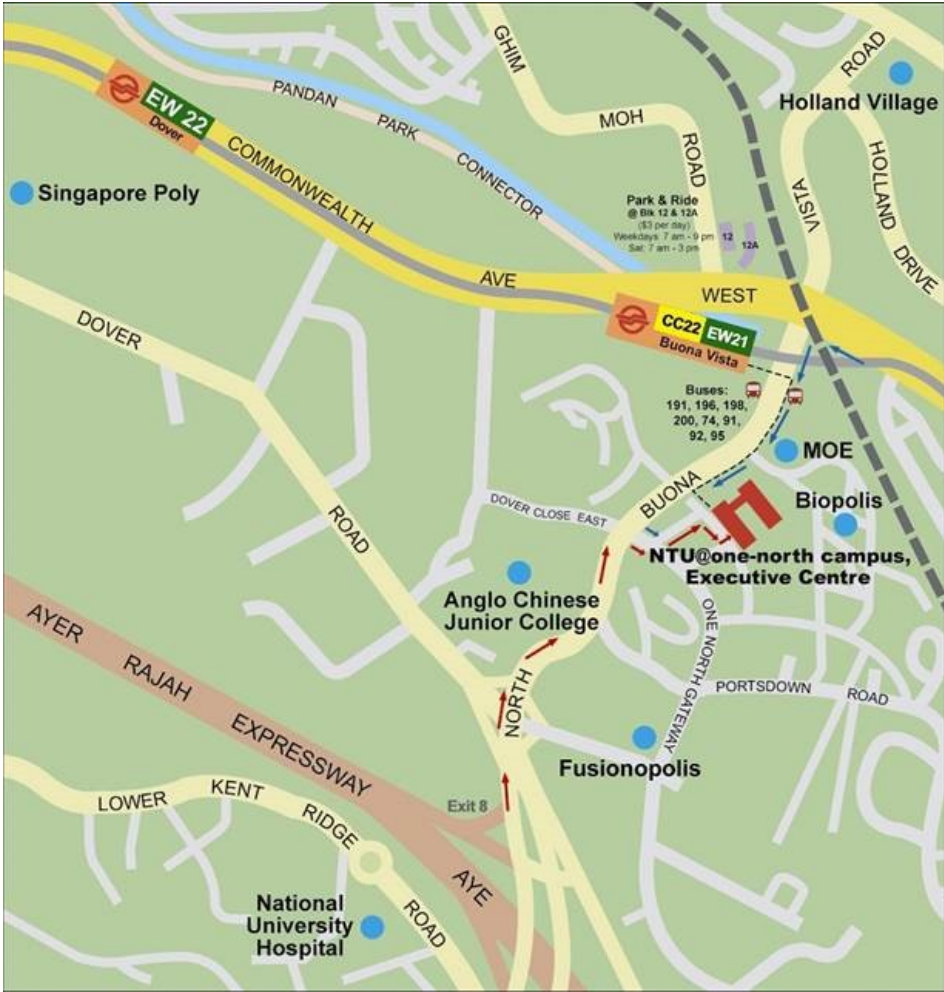
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NTU@one-north

Add: 11 Slim Barracks Rise, one-north Executive Centre #06-04, Singapore 138664



# VENUE



### TIPS:



Weather

High Temperature: 29°C/84°F | Low Temperature: 26°C/ 79°F



Time Zone

GMT+8



Currency

Singapore Dollar



Important Phone Numbers

Emergency Ambulance & Fire: 995

Non-Emergency Ambulance: 1777

Police Emergency: 999

# AGENDA

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[April 27, 2019]



NTU@one-north

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Lobby



10:00-17:00



Registration & Material Collecting

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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 & dinner coupon, conference program, the receipt of the payment and an USB drive with paper collection.

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
## Tips for Participants

- ✧ Your punctual arrival and active involvement in each session will be highly appreciated.
- ✧ The listeners are welcome to register at any working time during the conference.
- ✧ Get your presentation PPT or PDF files prepared.
- ✧ Regular oral presentation: 15 minutes (including Q&A).
- ✧ Laptop (with MS-Office & Adobe Reader), projector & screen, laser pointer will be provided by the conference organizer.
- ✧ Please keep all your belongings (laptop and camera etc.) with you in the public places, buses, metro.

# AGENDA

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 **[April 28, 2019]**  
**Morning**  
 **NTU@one-north**

 <b>LT301, 3rd Floor</b>	
<b>09:00-09:10</b> <b>Opening Remark</b>	<b>Prof. Wang Peng</b> Nanyang Technological University, Singapore
<b>09:10-09:50</b> <b>Keynote Speech I</b>	<b>Prof. Jen Tien-Chien</b> University of Johannesburg, South Africa <b>Title-</b> The Way Forward in Numerical Investigation of the Atomic Layer Deposition Process
<b>09:50-10:20</b>	 <b>[Group Photo &amp; Coffee Breaks]</b> <b>outside of LT301/3Fs</b> <b>Poster Display</b> S1-0018-A; S1-1003
<b>10:20-11:00</b> <b>Keynote Speech II</b>	<b>Prof. Wang Peng</b> Nanyang Technological University, Singapore <b>Title-</b> Impacts of High Penetration of Electric Vehicle (EV) Loads and Wind Power Generation on Operation and Reliability of Power Systems
<b>11:00-11:40</b> <b>Keynote Speech III</b>	<b>Prof. Walid DAUD</b> City University of Hong Kong, Hong Kong <b>Title-</b> Emerging Renewable Energy Technologies



**Lunch @outside of LT301/3Fs**  
**<11:40-13:00>**

# AGENDA



**[April 28, 2019]**


**Afternoon**



**NTU@one-north**




**SR906, 9th Floor**

<b>13:00-15:15</b> Session I	<b>[Power system stability and fault detection]</b> Chaired by TBA
	<b>9 Presentations</b> —S1-0081, S1-0027, S2-0025-A, S1-0034, S1-0040, S1-0026, S1-0085, S2-0016, S2-0009
<b>15:15-15:45</b>	 <b>Coffee Break</b> outside SR906&SR907
<b>15:45 -18:30</b> Session II	<b>[Electrical Theory and Electronic Technology]</b> Chaired by TBA
	<b>11 Presentations</b> —S1-0056, S2-0008, S1-0028, S1-0066, S1-0094, S1-0035, S1-0089, S1-0086, S1-0074, S1-0058, S1-0038



**SR907, 9th Floor**

<b>13:00-15:15</b> Session III	<b>[Power Data Management and Modeling Analysis]</b> Chaired by TBA
	<b>9 Presentations</b> —S2-1002, S1-0020, S2-0020, S1-0029, S1-0030, S1-0009, S1-0082, S1-0048, S1-0060
<b>15:15-15:45</b>	 <b>Coffee Break</b> outside SR906&SR907
<b>15:45 -18:30</b> Session IV	<b>[Motor and electrical control technology]</b> Chaired by TBA
	<b>11 Presentations</b> —S1-0073, S1-0069, S1-0071, S1-0076, S1-0072, S1-0061, S1-0059-A, S1-0062, S1-0017, S1-0042, S1-0022



**Dinner | <18:30-20:00>**

# WELCOME



## [April 29, 2019] Morning

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SR706, 7th Floor

<b>9:00-12:00</b> Session V		<b>[Smart Grid Analysis and Optimization]</b> Chaired by TBA
		<b>12 Presentations</b> —S1-0077, S1-0041, S1-1002, S2-0004, S2-0023, S1-0012, S2-0013, S1-0078, S1-0051, S1-0015, S2-0014, S2-0011-A
<b>9:00-11:45</b> Session VI		<b>[Energy Engineering and Energy Storage Technology]</b> Chaired by TBA
		<b>11 Presentations</b> —S2-0015, S2-0005, S1-0052, S1-0024, S1-0087, S1-0046, S2-0010, S1-0003, S1-0068, S2-0027, S1-0065



Lunch@outside meeting room

<12:00-13:30>



## [April 29, 2019] Afternoon

NTU@one-north



SR706, 7th Floor

<b>13:30-16:00</b> Session VII		<b>[Photovoltaic systems and power generation technologies]</b> Chaired by TBA
		<b>10 Presentations</b> —S2-0028, S2-0018, S1-0090, S1-0045, S1-0008, S1-0083, S1-0001, S2-0012, S2-0019, S1-0084
<b>13:30-15:00</b> Session VIII		<b>[New materials and advanced manufacturing processes]</b> Chaired by TBA
		<b>6 Presentations</b> —S1-0033, S1-0016, S1-0079, S1-0067, S1-0093, S1-0088



# WELCOME

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## April 30, 2019] Social Program

**Duration: 10:00 -19:00**

**Departure Time: 09:40**

**Departure Point: Park Avenue Rochester**

**Address: 31 Rochester Drive, Queenstown, Singapore, 138637, Singapore**

### Overview

This tour allows you to experience all the highlights of Sentosa Island during a single 5-hour excursion. Take a cable car ride from Mt. Faber, visit the SEA Aquarium, take the Tiger Sky Tower Ride, and see impressive water, laser, and fire effects at the Wings of Time show. All entrance fees included, pickup and drop-off from select hotels available.

### Highlight

- ✧ Comprehensive tour of Sentosa Island
- ✧ Ride the Singapore Cable Car from Mt. Faber
- ✧ Visit the SEA Aquarium
- ✧ Wings of Time Night Show

### Inclusions

- ✧ Professional, informative and friendly licensed guide
- ✧ Local taxes
- ✧ All entrance fees

### Exclusions

- ✧ Food and drinks
- ✧ Gratuities
- ✧ Souvenir photos (available to purchase)

### Note

\* If you are interested, please give your feedback before **April 15**. If you miss this date, we can't accept your request anymore.



# WELCOME

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Dear distinguished delegates,

It is our great honor and pleasure to welcome you to The IEEE 2nd International Conference on Power and Energy Applications (ICPEA 2019) and the 2nd International Conference on Smart Grid and Energy (ICSGE 2019) which will be held in Singapore on April 27-30, 2019.

We'd like to express our heartfelt appreciation to our chairs, sponsors, technical program committee members, organizing committee members, authors and delegates, who made a lot of efforts and contributions year by year. Thanks to your support and help, we can hold this conference successfully and always keep making progress.

The evaluation of all the papers was performed based on the reports from anonymous reviewers, who are qualified in the field of computer and communication system. As a result of their hard work, we are pleased to have accepted 83 presentations (initially from 130 submissions) coming from 20 countries and districts: China, Egypt, India, Indonesia, Iran, Malaysia, Nigeria, Oman, Pakistan, Philippines, Senegal, Singapore, South Africa, South Korea, Sri Lanka, Taiwan, Thailand, UAE, UK, USA in this program.

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. Wang Peng as IEEE Fellow from Nanyang Technological University, Singapore, who is delivering a speech on "Impacts of High Penetration of Electric Vehicle (EV) Loads and Wind Power Generation on Operation and Reliability of Power Systems"; Prof. Jen Tien-Chien, from University of Johannesburg, South Africa, who will make a speech on "The Way Forward in Numerical Investigation of the Atomic Layer Deposition Process"; and Prof. Walid DAOUD, from City University of Hong Kong, Hong Kong with a talk on "Emerging Renewable Energy Technologies".

On April. 28-29 we have 8 parallel presentation sessions including Power system stability and fault detection, Electrical Theory and Electronic Technology, Power Data Management and Modeling Analysis, Motor and electrical control technology, Smart Grid Analysis and Optimization, Energy Engineering and Energy Storage Technology, Photovoltaic systems and power generation technologies, New materials and advanced manufacturing processes. The platform is ready, so please seize this opportunity to show your thoughts and opinions confidently.

Wish you will enjoy this conference, contribute effectively toward it and take back with your knowledge, experiences, contacts and happy memories of these days. Thank you for your attention!

Yours sincerely,

Conference Organizing Committee

# SPEAKERS

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**Prof. Wang Peng**

**IEEE Fellow**

**Nanyang Technological University, Singapore**

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Peng Wang received his B.Sc. degree from Xian Jiaotong University, China, in 1978, the M. Sc. degree from Taiyuan University of Technology, China, in 1987, and the M. Sc. and Ph.D. degrees from the University of Saskatchewan, Canada, in 1995 and 1998, respectively.

He was a lecturer and senior lecturer in Electrical Engineering Department at Taiyuan University of Technology from 1978-1991. He worked as visiting scholar in Electrical Engineering Department at British Columbia University, Canada, in 1992. He is currently a professor of the School of Electrical and Electronic Engineering at the Nanyang Technological University, Singapore.

He is a Fellow of The Institute of Electrical and Electronics Engineers (IEEE). He served as an Associate Editor of the IEEE Transaction on Smart Grid and a Guest Editor of Journal of Modern Power Systems and Clean Energy for special issues on Smart Grids. He is currently an Associate Editor of IEEE Transaction on Power Delivery and Guest Editor-in-Chief of CSEE Journal of Power and Energy Systems for special issues on Hybrid AC/DC Grids for Future Power Systems.

He as a principle investigator (PI) and Co-PI has been awarded over \$15 million research grant from industries and government organizations from Singapore, China, USA and Europe to work on Hybrid AC/DC Micro-grids; Smart Grid; Power system operation, planning, reliability and renewable integration.

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**Title---** **Impacts of High Penetration of Electric Vehicle (EV) Loads and Wind Power Generation on Operation and Reliability of Power Systems**

**Abstract---** Hi penetration of EV Loads and renewable generation will significantly affect power system operation and reliability from both load and generation sides. EV loads also affect transportation system. This talk will introduce some techniques developed by the research team from Nanyang Technological University, Singapore and Taiyuan University of Technology, China to comprehensively model EV movements and frequency variation due to wind power intermittence and their impacts on power systems from both time and location aspects.

# SPEAKERS

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**Prof. Jen Tien-Chien**  
**University of Johannesburg, South Africa**

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Tien-Chien Jen is a professor in the Department of Mechanical Engineering Science in the School of Mechanical and Industrial Engineering at the University of Johannesburg in South Africa. His current interest centers on cutting-edge hydrogen energy generation and storage. Topics range from constructing a hydrogen-powered ATV to finding novel materials and techniques to coat fuel cells to increase electron conversion efficiency.

Dr. Jen has also acquired extensive administrative experience, as the Interim Dean of the College of Engineering and Applied Science at the University of Wisconsin – Milwaukee and as Dean of the College of Engineering at the University of Alaska Anchorage. His varied and numerous accomplishments include establishing the new Engineering and Industrial building, establishing and strengthening industrial partnerships with local companies, such as ConocoPhillips and BP, and obtaining multimillion-dollar commitments for scholarships and equipment requisitions. He has also championed diversity and has actively encouraged traditionally underrepresented minorities to major in Engineering.

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## **Title--- The Way Forward in Numerical Investigation of the Atomic Layer Deposition Process**

**Abstract---**The micro-semiconductor industry has ever since the inception, been confronted with the deposition of thinner films. These films are accompanied by some exceptional attributes to meet the requirement for the manufacture components with desired durability, efficiency and performance. The industry has, however, sort after atomic layer depositions (ALD) which has so far proven capable of depositing quality nano-films of superb features. These features are of utmost importance for advanced technology and to achieve optimized efficient products that require pin-hole-free, uniform, conformal and accurate thickness control. It is necessary to continually fathom and refined the knowledge of the fabrication process. The research endeavour within this field is studied by collaboration of Prof TC Jen and his team of researchers. The aim of understanding the thin film process of ALD is studied within the reactor to feature scale. The continuum, lattice Boltzmann, density function theory, molecular dynamics are utilized to numerical model the numerous phenomena inside the reactors and thin film features. This keynote reports on the current findings of the numerous research endeavours. This includes the behaviour and optimization of geometrical designs, ALD recipe refinements, velocity and exposure time phenomena, the chemical kinetics hypothesis, and the way forward in ALD numerical investigations.

# SPEAKERS

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**Prof. Walid DAOUD**  
**City University of Hong Kong, Hong Kong**

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Dr. Daoud is Associate Dean (Research and Graduate Studies) and Associate Professor in the School of Energy and Environment at City University of Hong Kong. He graduated from the University of Technology Graz, Austria, with a Dipl-Ing degree (BS and MS) in Chemical Engineering and received his PhD in bilayer photovoltaic cells from the University of Sheffield, UK. In 2002, he joined the Hong Kong Polytechnic University, where he played a substantial role in the establishment of a Nanotechnology Center in 2003 and took up a lectureship in 2005. In 2007, he moved to Monash University to take up a lecturer post and was promoted to senior lecturer in 2010. Dr Daoud has received international renown and several awards for his pioneering work on solar self-cleaning and kinetic energy harvesting technologies. His research has featured in Nature (2004) and Science (2008) and the international press, such as Reuters (2014), BBC (2015) and SCMP (2017). His current research is mainly focused on the areas of renewable energy conversion and storage and smart textiles.

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## **Title--- Emerging Renewable Energy Technologies**

**Abstract---** Development of renewable energies is crucial for meeting future energy needs. Solar, mechanical and kinetics energies can provide sufficient electricity needed in daily life. In this pursuit, solar and kinetic energy harvesting approaches have been developed for energy conversion. While solar self-cleaning technology mainly converts the UV and visible regions of the solar spectrum, kinetic energy of human body movements can be harvested to generate electricity. Being intermittent energy sources, it is equally important to find storage solutions for renewable energy. This seminar intends to present the underlying concepts of the transduction mechanisms and recent research accomplishments. Future prospects and suggestions of the potential application of these technologies will also be discussed.