2020 International Conference on Ubiquitous Power Internet of Things UPIOT 2020

In Conjunction with SGESG 2020

Conference Program

www.upiot.org

www.sgesg.org

Conference organized by
Asia Pacific Institute of Science and Engineering (APISE)

Sponsored by
IEEE Industrial Electronics Society Shanghai Chapter
Member Center of Shanghai Jiao Tong University, Chinese Society for Electrical Engineering, CSEE
IEEE PES Chongqing Chapter
Hong Kong Society of Mechanical Engineers (HKSME)
Sichuan Nuo Yi Convention & Exhibition Service Co., Ltd

Media supported by
Journals Center, China Electric Power Research Institute

August 20-22, 2020 ● Xi'an, China

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WELCOME MESSAGE

Dear Participants,

As you know the onset of the current situation of COVID-19. Our conference, 2020 International Conference on Ubiquitous Power Internet of Things (UPIOT 2020) in conjunction with 4th International Symposium on Green Energy and Smart Grid (SGESG 2020) which is organized by Asia Pacific Institute of Science and Engineering(APISE), sponsored by IEEE Industrial Electronics Society Shanghai Chapter, Member Center of Shanghai Jiao Tong University, Chinese Society For Electrical Engineering, CSEE, IEEE PES Chongqing Chapter, Hong Kong Society of Mechanical Engineerings(HKSME) and Sichuan Nuo Yi Convention & Exhibition Service Co., Ltd., Media supported by Journals Center, China Electric Power Research Institute, is not an exception. To actively respond to the call of the government, to strengthen the protection work, to effectively reduce people gathering and prevent coronavirus transmission, UPIOT 2020 & SGESG 2020, which should be held in Xi'an, China from 20 to 22 August, 2020 as planned, is now changed as on-line conference.

However, the change of conference form will not influence on papers' publication and index. And there are two options: #Option 1: Author can submit full paper to publish paper in the volume of Journal of Physics: Conference Series (JPCS) (ISSN: 1742-6596), which will be submitted to Engineering Village, Scopus, Thomson Reuters (WoS) and other databases for review and indexing. #Option 2: Selected papers can be recommended to be published in Journal, AIMS Energy, (ISSN (Online): 2333-8334), and indexed by Emerging Sources Citation Index (ESCI - Web of Science), Scopus, EBSCO, CAS, etc.

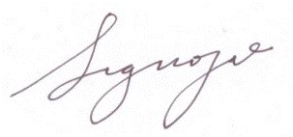
Also, the change of conference form will not influence on our conference's aim and pursuit. UPIOT &SGESG 2020 aims to present the latest research and results of scientists related to Ubiquitous Power Internet of Things, Green Energy, Smart Grid and other topics. By on-line oral presentations and poster presentation, this conference provides opportunities for the delegates to exchange new ideas, to establish business or research relations as well as to find global partners for future collaborations. We hope that the conference results will lead to significant contributions to the knowledge in these up-to-date scientific fields.

We would like to thank our outstanding Keynote Speakers: Prof. Chen Shen, Tsinghua University, China; Prof. Wei Gu, Southeast University, China; Prof. Daogang Peng, Shanghai University of Electric Power, China Prof. Laili Wang, Xi'an Jiaotong Univeristy, China; Prof. Lijun Hang, Hangzhou Dianzi University, China; Prof. Zhe Li, Shanghai Jiaotong Univeristy, China, and our outstanding Invited Speakers, Prof. Hongtao Wang, Shandong Univeristy, China; Prof. Dayi Li, Huazhong University of Science and Technology, China; Prof. Lingen Luo, Shanghai Jiaotong

Univeristy, China; Prof. Zhifang Yang, Chongqing University, China, for sharing their deep insights on future challenges and trends.

We would like to thank all the committees for their great support on organizing the conference. We also would like to thank all the reviewers for their great effort on reviewing the papers submitted to UPIOT 2020 and SGESG 2020. Special thanks to all the researchers and students who with their work and participate in the conference.

We hope all is well with everyone, with families and friends.



Conference Chair

Prof. Guojie Li, Shanghai Jiao Tong University, China

CONFERENCE SPEAKERS

Keynote Speakers

Prof. Chen Shen
Tsinghua University, China

Biography: Chen Shen received the B.E. and Ph.D. degrees in electrical engineering from Tsinghua University, Beijing, China, in 1993 and 1998, respectively. He was a postdoctoral research fellow with the University of Missouri-Rolla from 1998 to 2001. He served as a senior application developer in ISO New England, USA, during 2001-2002. He has been a professor of the Electrical Engineering Department of Tsinghua University since 2009. He is currently the Director of Research Center of Cloud Computing and Intelligent Decision-making, Sichuan Energy Internet Research Institute, Tsinghua University. He was supported by the Ministry of Education's Program for New Century Excellent Talents in Universities in 2009. His researches focus on power system analysis and control, including fast modeling and simulation of smart grids, cloud computing and AI application in power systems, stability analysis of power systems with renewable energy generation, emergency control and risk assessment of power systems, operation and control for micro-grids. He has led more than 20 projects, such as National Natural Science Foundation of China, the National High-Tech Research and Development Program (863) of China, Key Project of Chinese National Programs for Fundamental Research and Development (973), National Key Research and Development Program of China, etc. Chen Shen has more than 150 journal and conference publications, owns 22 patents and has authored 1 book.

Keynote Lecture: A High-Performance Power System Simulator Based on Cloud Computing
With the increasing computations in power system simulations, high-performance and cost-effective power system simulator is highly required. A cloud-computing based power system simulator, namely CloudPSS, is designed by the Research Center of Cloud Simulation and Intelligent Decision-making (CSAID) of Tsinghua Sichuan Energy Internet Research Institute. This seminar discusses the modeling technique, simulation algorithm, parallel accelerating strategies, and platform architecture of CloudPSS. The most recent techniques, benchmarks and performance of CloudPSS are also presented.

Prof. Wei Gu
Southeast University, China

Biography: Dr. Wei Gu is a Professor, Doctoral Supervisor and Associate Dean of the School of Electrical Engineering, Southeast University. He is also the Director of Research Institute of Distributed Generations and Active Distribution Networks, and Vice Director of the Power System Simulation Committee of China Simulation Federation. His research interests include distributed generations, microgrids, active distribution network and integrated energy system. He has presided over one key project (NSFC-SGCC Joint Fund for Smart Grid) and three General/Youth projects of the National Natural Science Foundation of China, one Sub Project of the National Key Research and Development Program. He has published over 90 SCI papers, and 5 papers are ESI Highly Cited Papers (Top 1%). His H-index is 27 and the total citation is 2979 (based on Google Scholar), 773 of which are cited by SCI papers. He has more than 30 China National Invention Patents and 1

United States Invention Patent, all granted. As the first completer, he won the First Prize of Science and Technology of China Simulation Federation, and the Golden Prize of the 48th International Exhibition of Inventions Geneva. His research output has been successfully applied to over 20 projects of distributed generation, micro-grid and active distribution network systems.

Keynote Lecture: Distributed Control in Microgrids

Environmental concerns, fossil depletion, and increasing penetration of renewable energy sources are pushing the incumbent power generation paradigm toward a more distributed future. The microgrid (MG), which indicates a localized cluster of distributed generations (DG), loads and storages continues to gain popularity, where the cooperation control scheme is indispensable to ensure voltage/frequency regulation, load sharing, power balance due to the heterogeneous properties of energy generations. The conventional centralized control assumes a centralized controller for the global decision-making but is sensitive to a single point-of-failure, while the decentralized control with high reliability threatens system stability due to the lack of effective global information, both of which restrict the MG operation.

To deal with these challenges, the distributed control structure in MG will be presented, where each DG exchanges information with its immediate neighbors via the spare network. First, the distributed dynamic cooperative control based on average consensus and feedback control is elaborated, adaptive to real-time perturbations in a precise format. Then, the pinning cooperative control aims to simplify the control complexity and enhance control performance with the increasing scale of DGs. Considering that the conventional decision based on the current local-neighboring DG may lead to false/over/under control, the distributed model predictive cooperative (DMPC) control takes the advantage of predicted trend and rolling optimization to improve dynamic performance and robustness. Therefore, both the high reliability and global optimization of MG cooperative operation are guaranteed.

Prof. Daogang Peng
Shanghai University of Electric Power, China

Biography: Peng Daogang, male, doctor, professor, dean of College of Automation Engineering, Shanghai University of Electric Power; deputy director of Shanghai Power Generation Process Intelligent Control Engineering Technology Research Center. He is mainly engaged in Smart Power Generation, Smart Energy, Energy Internet and other aspects of research. He has undertaken more than 40 scientific research projects involving several institutes such as National Natural Science Foundation of China, Shanghai Science and Technology Commission, State Grid, BaoSteel, Huaneng Group, etc. He has published more than 200 academic papers, including more than 100 published in SCI and EI; and published 3 academic works; 25 national invention patents have been authorized. His scientific research achievements have won two first prizes and three second prizes of science and technology awards from Shanghai and Ministry of Education. He has held academic part-time committee members in the National Technical Committee for Standardization of Electrical Equipment Network Communication Interface, the Power Generation Automation Committee of Chinese Association of Automation, the Intelligent Power Generation Committee of China Energy Research Society, the Thermal Automation Committee of Chinese Society for Electrical Engineering, and the Deputy Secretary General of Shanghai Association of Artificial Intelligence.

Keynote Lecture: Key Technologies and Applications of Urban "Photovoltaic-Storage-Charging-Swapping" Integrated Smart Energy System

The integrated intelligent charging/swapping platform of urban "Photovoltaic-Storage -Charging-Swapping" is an integrated smart energy system composed of photovoltaic, energy

storage, charging station, swapping station, etc. The system adopts advanced technologies such as Cloud Computing, Big Data, Internet of Things, Mobile Internet and Artificial Intelligent to realize rapid and intelligent orderly charging/swapping of large-scale electric vehicles through advanced functions such as collaborative control, operation optimization and energy management of each subsystem. In addition, the system achieves high-efficiency, economical, smart and green energy supply through the bilateral flexible interaction with the supply and demand of the smart grid, which has great significance for promoting the integration and rapid development of electric vehicles and urban Energy Internet.

Prof. Laili Wang
Xi'an Jiaotong Univeristy, China

Biography: Laili Wang is a Professor in Electrical Engineering School of Xi'an Jiaotong University, His research focuses on Packaging of WideBand-Gap Devices and System Integration. He is chair of IEEE PELS and CPSS Xi'an joint chapter, co-chair of system integration in ITRW, an associate editor of several Power Electronics journals including IEEE Transactions on Power Electronics. He initiated the first IEEE Wide-BandGap Power Devices and Applications in Asia in 2018 with himself as the Technical Program Chair.

Keynote Lecture: Packaging and Integration of Wide-Band-Gap Devices and Their Applications in Power Equipment

Compared with silicon devices, Wide-Band-Gap power devices have the advantages of high switching speed, high operating temperature, low conduction loss, thus could improve the power density and efficiency of power electronics converters significantly. However, the potential of Wide-Band-Gap power devices have not been fully explored for the limitation of packaging, this presentation will introduce the modeling, new packaging and integration technology and the applications in detail.

Prof. Lijun Hang
Hangzhou Dianzi University, China

Biography: Lijun Hang (M'09, SM'2018) received the B.S. and Ph.D. degrees in electrical engineering from Zhejiang University, Hangzhou, China, in 2002 and 2008, respectively. From 2008 to 2011, she was a Postdoctoral Researcher with Zhejiang University. From 2011 to September 2013, she was a Research Assistant Professor with CURENT, University of Tennessee, Knoxville, TN, USA. From 2013 to 2015, she was an Associate Professor at the Department of Electrical Engineering, Shanghai Jiao Tong University, Shanghai, China. She is currently a professor of Hangzhou Dianzi University (HDU). She has authored or co-authored more than 120 published technical papers. Her research interests include modeling methods of power covnerters, digital control of power electronics for grid connected converters, converters for HVDC and renewable energy system.

Keynote Lecture: High-Efficiency Hybrid Three-Level Dual Active Bridge DC/DC Converter

For bidirectional DC/DC converters, dual active full-bridge converters (Dual Active Bridge Converter, DAB) are widely used in high-power occasions such as DC microgrid and electrified transportation power supply system due to their simple structure and flexible control methods. The large return power in the voltage range and the inability to implement soft switching limit the

application in a wide voltage range. To solve this problem, the hybrid three-level dual active bridge (H3L-DAB) converter is selected as the research object. Compared with the traditional two-level DAB converter, the three-level bridge arm of H3L-DAB introduces an intermediate level, which adds a degree of freedom of control, thereby controlling the inductor current more flexibly. The typical three-level structures will be compared, the advantages and disadvantages of three-level converters will be given as well. The basic working principle of the bidirectional hybrid three-level DAB converter will be discussed. On this basis, the working principle of H3L-DAB converter under PWM+phase shift control will be analyzed in detail, the working modes will be divided, several common working modes will be selected, and the working characteristics and soft switching characteristics of the converter will be analyzed. Then, for the application of hybrid three-level dual active bridge converter in highvoltage input and high-current output scenarios, a multi-objective optimization control strategy will be proposed to comprehensively optimize the modulation strategy and take into account multiple optimization objectives. Specific optimization objectives include: Realize ZVS on the high voltage side; realize ZCS on the high current side; reduce the effective value of the inductor current. Finally, a simulation model and a bunch of experimental results will be given to verify the control strategy.

Prof. Zhe Li
Shanghai Jiaotong Univeristy, China

Biography: Zhe Li is now an associate professor in the Department of electrical engineering, Shanghai Jiaotong University. In July 2000, he obtained a bachelor's degree in engineering from Shanghai Jiaotong University and a doctor's degree in engineering from Shanghai Jiaotong University in November 2007. In September 2009, he obtained a postdoctoral degree from Waseda University, Japan. He has successively served as a political and ideological teacher of Shanghai Jiaotong University, lecturer of Electrical Engineering Department of Shanghai Jiaotong University, guest lecturer of Waseda University of Japan, and director of science and Technology Cooperation Office of Institute of science and technology development of Shanghai Jiaotong University. More than 70 papers have been published in domestic and foreign journals and international conferences. He undertook 973/863 sub projects and several NSFC and horizontal research projects. The main research directions are artificial intelligence and edge computing technology, on-line monitoring technology of power equipment insulation status, and research on composite insulation characteristics.

Keynote Lecture: Pin Defect Detection Method of UAV Patrol Overhead Line Based on Cascaded Convolution Network

Pin plays the role of fixing power equipment on the overhead line. Once it is missing, it will lay a serious hidden danger for the normal operation of the overhead line. In view of the complex background of inspection image and the small size of pin, this paper proposes a pin defect detection method based on cascaded convolution network. The training samples are preprocessed by data enhancement techniques such as Gaussian blur and brightness random disturbance before defect detection. The overall detection method is divided into two parts: positioning and diagnosis. Firstly, all fastener positions including pins are located by the improved Faster-RCNN network, and then RetinaNet network is cascaded to diagnose the defects of the fastener. Through cascade step-by-step detection, the block location information of the target object is effectively extracted from the complex background, and the interference of the invalid image information is eliminated. The experiment shows that this method can effectively detect the pin defects in the UAV patrol image. The Precision rate reaches 91.8%, the Recall rate reaches 90.3% on the test data set and it has good robustness to the change of light intensity.

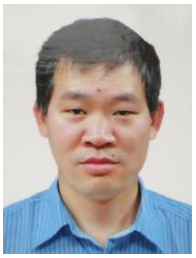
Invited Speaker

Prof. Hongtao Wang
Shandong Univeristy, China

Biography: Hongtao Wang received the B.E. and M.E. degrees in electrical engineering from Shandong Polytechnic University, Jinan, China, in 1995 and 1998, respectively, and the Ph.D. degree in electrical engineering from Shandong University, Jinan, in 2005. He was a postdoctoral research fellow with the Department of Computer Science, Shandong University from 2005 to 2007. He served as an associate professor with the School of Electrical Engineering, Shandong University since 2005, where he has been a professor since 2010. He is currently the chief of Research Center for Ultra-High Voltage Grids, Shandong University Key Laboratory of Power System Intelligent Dispatch and Control, Ministry of Education. His researches focus on power system analysis and control, including power system resilience, restoration, renewable energy integration, and optimization. He has led more than 20 projects, such as the National Natural Science Foundation of China, etc. He has more than 80 journal and conference publications, owns 16 patents and is the author of Power System Restoration Theories and Technologies published by Science Press.

Invited Lecture: Grid forming with inverter based generation for unconventional state power system restoration

In recent years, power grid accidents occurred in venezuela, Iran and other power grids beyond the scope of power grid failure in the conventional sense, with the characteristics of targeted destruction of key facilities. In the unconventional state, the failure risk of the key black-start power supply such as pumped storage and gas unit is high as the emergency equipment, and the system recovery task is difficult to be undertaken without power supply. It is the strategic need to seek the alternative black start power supply and its recovery control method to ensure the security of China's power grid. Firstly, according to the requirements of black start, in the transient time scale, aiming at the coordination and cooperation between the fast dynamic of inverter interface power supply and the slow dynamic of conventional units, a virtual synchronous generator grid forming technology adapted to the black start scenario is proposed. Secondly, in the medium and long time scale of system recovery, a robust distributed recovery decision method of prediction - control - dispatch coordination is established according to the characteristics of output fluctuation and distribution dispersion of inverter interface power supply. Finally, according to the needs of the transition from abnormal to normal power grid, the state identification, state assessment and state switching methods of abnormal recovery are studied to realize the evolution simulation and state assessment of abnormal recovery of power grid. It is expected to provide new theoretical support for the construction of diversified black-start power supply and flexible recovery means for power grid.



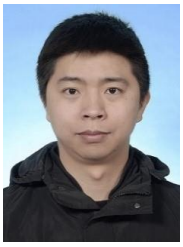
Prof. Dayi Li
Huazhong University of Science and Technology, China

Biography: Prof. Dayi Li, (Huazhong University of Science and Technology) received the B.S. degree from Tianjin Polytechnic University in 1995, and M.S. and Ph.D. degrees from Huazhong University of Science and Technology (HUST) in 2000 and 2005, respectively. From 1995 to 1997, he was an Electrical Engineer at Wuhan No.3 Cotton Mill Company. In 2000, he joined HUST as Assistant Professor and currently is full Professor. From 2011 to 2012, he was a visiting researcher in the Department of

Electronic and Electrical Engineering at the University of Sheffield, UK. From August 2016 to August 2017, he was arranged by the Organization Department of Jiangsu provincial Party committee to serve as Deputy director of Jingjiang Economic and Information Commission, deputy mayor of Jishi Town People's government, and external expert of Shenzhen power supply company Senior member of China Power Supply Association. He was a member of the 9th national transformer standardization committee (SAC/TC44). He presided over and participated in 6 projects of National Natural Science Foundation of China, was responsible for a key special sub project of National Key R&D Program of China, presided over 4 science and technology projects of China Southern Power Grid Corporation, 4 science and technology projects of State Grid Corporation of China. He published more than 100 papers, including more than 30 SCI / EI papers and more than 40 invention patents accepted / authorized. His research interests are power quality controller, transformer and power electronics.

Invited Lecture: A novel integrated multifunctional power quality controller for microgrid

In order to maximize the operational efficiency of the distributed energy resources (DER) and take full advantage of distributed power generation, as an effective means of integrating DERs into the traditional power grid, microgrid is presented. Microgrid power quality has the following unique features compared to the conventional power grid: 1) Background harmonic of DERs and harmonic high penetration are more serious than the traditional grid. 2)Bidirectional power flow control is much more challengeable. 3)Voltage fluctuation and sag often happen in microgrid. 4)The overvoltage and overcurrent phenomena is more frequent. In order to solve these problems, a novel variable reactor based on magnetic flux control is proposed in the paper. The system configuration of the novel variable reactor is presented, whilst its operational principle and dynamic performance are analyzed. Based on the developed variable reactor, a novel integrated power quality controller suitable for microgrid is proposed, which can cater for the peculiar requirements of microgrid power quality, such as the harmonic high penetration, frequent voltage fluctuation and overcurrent phenomenon, bidirectional power flow and small capacity etc. For the fundamental, the equivalent impedance of the primary winding is a variable reactor or capacitor. For the nth order harmonic, the equivalent impedance is very high impedance and acts as a “harmonic isolator”. The system control strategy is also analyzed in detail. A set of three-phase integrated power quality controller has been constructed. The experimental test results verify the validity of the novel variable reactor and the integrated power quality controller.



Prof. Lingen Luo
Shanghai Jiaotong Univeristy, China

Biography: Lingen Luo received his B.E. degree in electrical engineering from Fuzhou University, China, in 2004, the M.S. degree in electrical engineering from Shanghai Jiao Tong University, China, in 2008 and the Ph.D. degree in electrical engineering from Politecnico di Torino, Italy, in 2013. Currently, he is an Associate Professor in the Department of Electrical Engineering, Shanghai Jiao Tong University. His research interests are vulnerability analysis of power systems, condition monitoring of power apparatus, Bigdata and AI application in power systems. He has led more than 10 projects including the National Natural Science Foundation of China and State Grid Corporation of China. Lingen Luo has more than 30 journal and conference publications, owns 9 patents and 2 provincial awards.

Invited Lecture: IOT for Power Equipment Condition Monitoring and Diagnosis

The ubiquitous power internet of things (UPIoT) is an important technology and content for the upgrading of power equipment condition monitoring and diagnosis (CMD). This presentation focuses on the state-of-art of the key technologies of IoT for the improving of power equipment from the intelligent sensor, edge computing, big data analysis and artificial intelligence technology

point of views. Then the application framework and scenarios including power substation and distribution of IoT for power equipment are also introduced respectively. Then the development trends of UPIoT for power equipment CMD are discussed. The full perception of power equipment state through distributed intelligent sensor network will be widely used in the future power grid. On the other hand, more and more special and customized chips for CMD will be developed rapidly. Furthermore, the incoming blockchain also brings potential application together with IoT for power equipment CMD.

Prof. Zhifang Yang
Chongqing University, China

Biography: Zhifang Yang received his Ph.D. degree in electrical engineering from Tsinghua University in 2018. He currently works as an assistant professor at Chongqing University. His research interests include power system optimization and economic analysis. Zhifang Yang has published more than 30 peer reviewed papers in journals and conferences. He is the principle investigator of projects from the National Natural Science Foundation of China, State Grid Corp. of China, and other companies. He serves as the vice-chair of Task Force on Composite Reliability Assessment of IEEE PES, secretary of IEEE PES Chongqing chapter and actively participates in other international academic organizations and conferences.

Invited Lecture: Data-driven approach for power system probabilistic analysis

With the increasing uncertainties, probabilistic analysis has gained significant importance in power industries. However, traditional probabilistic analysis, including reliability analysis, risk assessment, and stochastic optimization, is normally time consuming. The heavy computational burden has become a bottleneck of their practical applications. Data-driven methods have the potential to overcome the computational barriers in the probabilistic analysis. For example, data-driven methods can extract the key feature of the uncertainty set (injection uncertainty and topology uncertainty) to reduce the computational effort; datadriven methods can directly project the output from the input based on historical data information. In this presentation, we will show the current achievements on the data-driven solutions for probabilistic analysis, which may promote the practical applications of probabilistic analysis in power industries. Potential challenges of data-driven probabilistic analysis in power industries will be discussed.

PRESENTATION PROGRAMME OVERVIEW

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Prof. Laili Wang</td></tr>
<tr><td>10:30-11:00</td><td colspan="2">Invited Lecture
Prof. Hongtao Wang</td></tr>
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INSTRUCTIONS TO PRESENTATIONS

Materials Prepared and Provided by the Presenters:

Oral Presenter:
PowerPoint or PDF files
Duration of each Presentation (Tentatively 15 minutes)
Laptops (with MS-Office & Adobe Reader)

Poster Presenter:
Poster: Color printing; Add Conference Name's Acronym on the top of poster (Such as "UPIOT 2020" and paper ID)

Minutes of Q&A

Keynote Speech: 35 Minutes of Presentation and 5 minutes' Q&A;
Invited Speech: 25 Minutes of Presentation and 5 minutes' Q&A
Presenter: 10 Minutes of Presentation and 5 minutes' Q&A

Online Presentation Guide:

1) The online presenter shall download the defaulted tool/software on the presenter's own computer, which will be notified by the organizing group ahead.
2) When there is presenter giving a talk, others will be mute by the administrator. After each talk, other audience can push the "raise your hands" button, then the presenter and audience will go on Q&A process.
3) When giving a talk on-line, the presenter shall push the "sharing in the group" button, then everyone will watch the PPT online. And the presenter shall set "sharing voice in the PPT".

NOTICE:

- Certificate of Participation will be awarded after the conference finished via fast delivery.
- One best presentation will be selected from each session. The best one will be announced when each session ends, and will be awarded with a "Best Presentation" certificate.

Online Video Conference Operation Guide via VooV
腾讯会议在线视频会议操作指南

● 会议信息(Conference Information):

时间 (Time)	会议室 (Room)	主题 (Topics)	会议 ID (Conference ID)	会议链接 (Link)
9:00-11:30 8 月 21 日(北京时间) August 21, Beijing time	Room 1	智能电网 (Smart Grid)	901 202 909	https://meeting.tencent.com/s/pXi4E6Jul88K
13:30-17:00 8 月 21 日(北京时间) August 21, Beijing time	Room 1	设备及状态监控 (Equipment and Status Monitoring)	901 202 909	https://meeting.tencent.com/s/pXi4E6Jul88K
13:30-17:00 8 月 21 日北京时间 August 21, Beijing time	Room 2	电力系统 (Power Electronics System)	533 820 446	https://meeting.tencent.com/s/vY2l4z0E6usz

● 测试(Testing):

所有参会者可于测试时间进入会议室，会议秘书会逐个安排做口头报告的参会者进行测试。
All the participants can join the conference room during the testing time, the conference secretary will arrange the participants who will do the oral presentation to test one by one.

测试房间 ID Testing ID	901 202 909
测试房间链接 Link	https://meeting.tencent.com/s/pXi4E6Jul88K
测试时间 Testing Time	9:30-12:00；14:00-18:00, 2020 年 8 月 17 日(北京时间) 9:30-12:00; 14:00-18:00, August 17, 2020 (Beijing time)

● 操作指南(Operation Guide):

1. 会议视频软件(video meeting software): VooV

下载链接(download link):

A.) 中文版
https://meeting.tencent.com/download-mac.html?from=1001&fromSource=1 (Mac OS)
https://meeting.tencent.com/download-win.html?from=1001&fromSource=1 (Windows)

B.) International Version
https://voovmeeting.com/download/darwin（Mac OS）
https://voovmeeting.com/download/windows （Windows）

2. 加入会议(Join the Conference):

方法一：点击会议链接，或选择“加入会议”后输入会议 ID。进入会议室时需填写手机号码进行验证；验证完成后在入会名称处输入您的“文章编号+姓名”即可进入。
Method 1: Click the Conference link, or click “Join the conference”, then input the Conference ID When you join the conference room, you need to fill in your phone number for authentication, then fill in your “Paper ID +Name” at the “Name” to join the conference.

*注：如您不能以游客身份直接“加入会议”，建议您按照方法二注册一个账号，登录后再加入会议。
*Tip: Should you fail to “Join the Conference” as a visitor, we suggest you register an account by method 2, then log in and join the conference.

方法二：您可在腾讯会议 APP 或官网（https://meeting.tencent.com/）中进行注册，登录后通过链接或输入会议 ID 加入会议。
Method 2: You can register at the APP/ website (https://www.voovmeeting.com/), log in and join the conference by the link or tap the Conference ID.

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TECHNICAL SESSION

Keynote Speech & Invited Speech Session: Smart Grid Chair: Guojie Li 9:10-11:30, August 21st, Friday Room 1 ID: 901 202 909			
Time	**No.**	**Content**	**Page**
9:10-9:50	KN1	Distributed Control in Microgrids ***Prof. Wei Gu,*** Southeast University, China	3
9:50-10:30	KN2	Packaging and Integration of Wide-Band-Gap Devices and Their Applications in Power Equipment ***Prof. Laili Wang,*** Xi'an Jiaotong Univeristy, China	5
10:30-11:00	IS1	Grid forming with inverter based generation for unconventional state power system restoration ***Prof. Hongtao Wang,*** Shandong Univeristy, China	7
11:00-11:30	IS2	IOT for Power Equipment Condition Monitoring and Diagnosis ***Prof. Lingen Luo,*** Shanghai Jiaotong Univeristy, China	8
11:30-13:30	**Lunch**		
Track 1: Keynote Speech & Invited Speech Session: Equipment and Status Monitoring 13:30-15:20, August 21st, Friday Room 1 ID: 901 202 909			
13:30-14:10	KN3	A High-Performance Power System Simulator Based on Cloud Computing ***Prof. Chen Shen,*** Tsinghua University, China	3
14:10-14:50	KN4	Pin Defect Detection Method of UAV Patrol Overhead Line Based on Cascaded Convolution Network ***Prof. Zhe Li,*** Shanghai Jiaotong Univeristy, China	6
14:50-15:20	IS3	A novel integrated multifunctional power quality controller for microgrid ***Prof. Dayi Li,*** Huazhong University of Science and Technology, China	7
15:20-15:30	**Break**		

Technical Session I: Equipment and Status Monitoring **Chair: Zhe Li** **15:30-16:15, August 21st, Friday** **Room 1 ID: 901 202 909**			
15:30-15:45	T003	Design and Implementation of Internet of Things-oriented CMTS Load Balancing Algorithm ***WEI Chunlei,*** NARI Group Corporation/State Grid Electric Power Research Institute, China	23
15:45-16:00	T1003	Preparation of endothermic highly hydrophobic anti-icing materials and their anti-icing properties ***Yongjing Peng,*** State Grid Hunan Electric Power Company,China	23
16:00-16:15	T1004	Research on the Development of the Ubiquitous Power Internet of Things ***Zhou Lidan***, Shanghai Jiao Tong University, China	23
Track 2: Keynote Speech & Invited Speech Session: **Power Electronics System** **13:30-15:20, August 21st, Friday** **Room 2 ID: 533 820 446**			
13:30-14:10	KN5	Key Technologies and Applications of Urban "Photovoltaic-Storage-Charging-Swapping" Integrated Smart Energy System ***Prof. Daogang Peng,*** Shanghai University of Electric Power, China	4
14:10-14:50	KN6	High-Efficiency Hybrid Three-Level Dual Active Bridge DC/DC Converter ***Prof. Lijun Hang,*** Hangzhou Dianzi University, China	5
14:50-15:20	IS4	Data-driven approach for power system probabilistic analysis ***Prof. Zhifang Yang,*** Chongqing University, China	9
15:20-15:30	**Break**		

Technical Session II: Power Electronics System Chair: Hongtao Wang 15:30-16:15, August 21st, Friday Room 2 ID: 533 820 446			
15:30-15:45	T2019	Electricity Prediction under Edge Devices Based on Sparse Anomaly Perception ***Jun Yang,*** University of Electronic Science and Technology of China, China	24
15:45-16:00	T2020	Physical Layer Secure Data Transmission for Mobile Edge Computing: Beamforming and Artificial Noise ***Jie Tang,*** University of Electronic Science and Technology of China, China	24
16:00-16:15	T2021	Secure Data Communication for Wireless Mobile Edge Computing Based on Artificial Noise and Security Code ***Jie Tang,*** University of Electronic Science and Technology of China, China	25
16:15-16:50	**Poster Session**		
16:50-17:00	**Closing Ceremony**		

Poster Session Chair: Dayi Li and Zhifang Yang 16:15-16:50, August 21st, Friday	
T004	Solar Road Power Generation Assessment Based on Coupled Transportation and Power Distribution Systems ***Lingjie Wu,*** Hohai University, Nanjing, China
T005	Benefit Models and Optimization Clearing Model for Participants in Cloud Energy Storage ***Yanzheng Wu,*** Hohai University, Nanjing, China
T006	Coordination of Active and Reactive Power in Active Distribution Networks Based on Successive Linear Approximation ***Jinhui Wang,*** Hohai University, Nanjing, China
T009	Planning and design of secondary monitoring system ***Xinyuan Tong,*** State Grid Shandong Electric Power Research Institute, China
T012	A Cooperative Block-variant Monitoring Mechanism Based on Spectral Clustering for Internet of Things ***Jiaxi Chen,*** The Smart City Research Institute of China Electronics Technology Group Corporation, China
T015	SNIPER based multi-target and multi-scale aerial image processing method ***Yaocheng Li,*** Shanghai Jiaotong University, China
T018	Research on incentive compensation strategy for EV users under the reform of power market ***X M Lin,*** Electric Power Research Institute, CSG, China
T021	FPGA-based Real-time Simulation for Multiple Energy Storage Systems ***Zirun Li,*** Shanghai Jiaotong University, China
T022	Substation equipment fault identification based on infrared image analysis ***Cong Zihan,*** Electric Power Research Institute of Guangdong Power Grid Co. Ltd., China
T024	Research on Commutation Failure of DC Transmission System Based on Harmonics ***Chu Chenyang,*** Hohai University, China
T025	Processor-in-the-Loop Simulation of Three Port DC/DC Converter for DC Power Generation and Distribution System ***Yang Yang,*** Harbin Institute of Technology, China; Shenzhen Academy of Aerospace Technology, China

T1001	Multi-objective Planning for Distributed Generation with Consideration of the Randomness of DG output ***WANG Hao,*** Xuzhou Power Supply Company, Electric Power of Jiangsu, State Grid, China
T1005	A Low Voltage Governance and Optimization Strategy for Distribution Network Based on Multi-objective Particle Swarm Optimization Algorithm ***Zhu Lu,*** Guangdong Power Grid Co., Ltd Guangzhou Power Supply Bureau, China
T1006	The topology of a new Energy Router and its coordinated control strategy ***Min Wang,*** Hohai University, China
T1007	Configuration Optimization of Ultrasonic Descaling Device for Condenser Based on Solidworks-Fluent ***Min Wang,*** Hohai University, China
T1008	Research on video detection of object intrusion in substation ***Hui Sun,*** Shanghai Jiao Tong University, China
T1009	Influence of VSC Converter Station on Switching Overvoltage of LCC Converter Station in LCC-VSC Hybrid DC System ***Lei Wang,*** Zhejiang University, China
T1011	Detection of Transient Junction Temperature Characteristics of High Power IGBT ***Tang Yong,*** Wuhan Donghu University, China
T1012	Simulation Research on Transient Junction Temperature Characteristics of High Power IGBT ***Tang Yong,*** Wuhan Donghu University, China
T1013	Research on a fundamental and harmonic detection method based on d-q rotating ***Jie Gong,*** Huazhong University of Science and Technology, China
T1014	An improved method for detecting harmonic currents based on ip-iq algorithm ***Jie Gong,*** Huazhong University of Science and Technology, China
T1017	International Practice of Improving Power System Flexibility and Its Enlightenment to China ***Zhengkan Liao,*** North China Electric Power University Beijing, China
T1018	Analysis of Transformer Operation State Based on Multi-dimensional Data Joint Analysis ***Yan Yingjie,*** Shanghai Heng Neng Tai Enterprise Management Co., Ltd.
T1020	GIS mechanical fault diagnosis method based on middle time Mel cepstrum coefficient ***Yi Jiang,*** Shanghai Jiao Tong University
T1021	Pin Defect Detection Method of UAV Patrol Overhead Line Based on Cascaded Convolution Network ***GU Chaoyue,*** Shanghai Jiao Tong University, China

T1023	Research on the Development Strategy of Platform-based Integrated Energy Service Providers in Power Internet of Things ***Linglong Tan,*** Anhui Xinhua University, China
T1024	Flexible multi state switch of distribution network based on Flux Controlled Adjustable Reactor ***Guangyi Zhang,*** Huazhong University of Science & Technology, China
T1027	Data Augmentation Method for Switchgear Defect Samples Based on Wasserstein Generative Adversarial Network ***Xueyou Huang,*** Liwan Power Supply of Guangzhou Power Supply Co. Ltd, China
T1028	Partial Discharge Pattern Recognition of Switchgear Based on Residual Convolutional Neural Network ***Xueyou Huang,*** Liwan Power Supply of Guangzhou Power Supply Co. Ltd, China
T1030	An Edge Computing Method for Partial Discharge under the Power Internet of Things ***Shaojing Wang,*** Electric Power Research Institute, Shanghai Municipal Electric Power Company, Shanghai, China
T1031	A Grid-Connected Microgrid Optimal Allocation Method Considering Self-Balancing Rate ***ZHANG Quanming,*** State Grid Zhejiang Electric Power Company, Ltd. Hangzhou 310000, Zhejiang Province, China
T1033	Optimal Planning Method for Distributed Wind/Solar/Battery Intergraded Microgrid ***ZHU Quan,*** State Grid Zhejiang Electric Power Company, Ltd. Hangzhou 310000, Zhejiang Province, China
T301	Performance Parameter Analysis of Power Cable Modified Polypropylene (MPP) Conduit ***Weiwei Zhang,*** State Grid Shandong Electric Power Research Institute, China
T302	Recognition method of aerial insulator defects based on deep learning ***J F Wang,*** Shanghai Dianji University, China
T304	Construction and Application of Distribution Network Grid Planning System ***Wang Yaolei,*** Economic&Technology Research Institute.State Grid Shandong Electric Power Company, Chinas
T305	Study on the temperature distribution of UHV arrester considering the influence of wind speed and sunlight ***Pipei ZHANG,*** State Grid Shandong Electric Power Research Institute, China
T306	The different LVRT control strategy of wind generator suppressing for transient overvoltage by DC commutation failure ***ZHAO Xuemao,*** Nari Group Corporation, China
T308	An Improved Control Strategy to Suppress the DC-Link Voltage Fluctuation for PMSG Wind Turbines ***Peng Wang,*** State Grid Shandong Electric Power Research Institute, China

T311	A Prediction Model for Time Series of Dissolved Gas Content in Transformer Oil Based on LSTM ***Chuye Hu,*** State Key Laboratory of Advanced Electromagnetic Engineering and Technology
T313	Infrared Detection and Thermoelectric Coupling Simulation Analysis of 220 kV Insulator Abnormal Heating ***Pipei ZHANG,*** State Grid Shandong Electric Power Research Institute, Jinan 250003, China
T2002	Research on The Quality Evaluation Method of Transmission and Transformation Inspection Data ***Qin Jiafeng,*** State Grid Shandong Electric Power Research Institute, China
T2003	Research on the economic benefits of roof photovoltaic based on the non-subsidy mode of environmental benefits ***Changhui Yang,*** Hefei University of Technology, China
T2004	Wind Turbine Power Curve Modelling Based on Hybrid Relevance Vector Machine ***Bo Jing,*** Beihang University, China
T2005	Fault Detection of Wind Turbine Converters with Time Sequence Processing and Attention Model ***Anqi Wang,*** Beihang University, China
T2006	Present Situation and Development of Internal Sensors for Ultra-high Frequency Detection in Gas Insulated Switchgear ***Li Chen,*** State Grid Zhejiang Electric Power Research Institute, Hangzhou, China; Shanghai Jiao Tong University, China
T2007	Simulation Study on Propagation Characteristics of Optical Signal of Point Discharge in GIS ***Chen Xiaoxin,*** State Grid Zhejiang Electric Power Research Institute, Hangzhou, China; Shanghai Jiao Tong University, China
T2008	A Study on the Extraction Method of Partial Discharge Features in Gas Insulated Switchgear Based on Ultra-High Frequency Signal Envelope ***Chen Xiaoxin,*** State Grid Zhejiang Electric Power Research Institute, Hangzhou, China; Shanghai Jiao Tong University, China
T2010	Demand Response Business Process Design Based on Functional Tree Model ***ZHANG Chen,*** State Grid Energy Research Institute Co., Ltd, China
T2011	Research on System Architecture of Internet Data Center Construction in Substation based on Ubiquitous Function ***ZHANG Chen,*** State Grid Energy Research Institute Co., Ltd, China
T2012	Reactive power optimization of power grid based on TTGA hybrid algorithm ***Lei Sun,*** Power China Northwest Engineering Corporation Limited, China

T2013	LDA Optimized Multi-scale Texture Features Based Diagnosis Method of Defects inside Insulated Tubular Busbars ***S Q Li,*** Shanghai Judian Electric Technology Company Limited, China
T2014	An Evaluation and Diagnosis Model for the operating tempo of Electric energy meter auto-verification line system Based on Fuzzy Inference ***Lixin Wang,*** State Grid Zhejiang Marketing Service Center (Melotrology Center, China
T2015	Probabilistic Wind Speed Forecasting based on Minimal Gated Unit and Quantile Regression ***Tianyang Chen,*** Beihang University, China
T2016	Graphical Characteristics Analysis of PD Signals Phase Distributions of XLPE Cables ***Z J Lan,*** Shanghai Jiao Tong University, China
T2017	An Evaluation and Diagnosis Model for the operating tempo of Electric energy meter auto-verification line system Based on Fuzzy Inference ***Y B Duan,*** Shanghai Jiao Tong University, China
T2018	Very short-term solar irradiance forecasting at a sub-minute scale based on WT-CNNs ***Zengwei Zhu,*** Hohai University, China

ABSTRACT

Technical Session I	
Time	**Content**
15:30-15:45 August 21st	**T003:** Design and Implementation of Internet of Things-oriented CMTS Load Balancing Algorithm **Presenter:** ***WEI Chunlei,*** NARI Group Corporation/State Grid Electric Power Research Institute, China **Abstract:** Dynamic load balancing is an important way to improve the resource utilization and parallel computing performance of multi-server system. For the mass of terminals under the Internet of Things scenario high frequency periodic escalation and receiving messages scene, the terminal equipment and message server need to establish a TCP long connection to communicate, the accumulation of messages different degree of weight will cause the load tilt. In this paper, an algorithm based on the socket buffer feedback mechanism is proposed, which takes the server load (CPU, memory, connection rate and socket buffer cache) as the load indicator, collects the load indicator through the load agent and calculates the discrete coefficient of the server socket buffer. The dispatch controller calculates the weight of each server, and the higher the weight, the lighter the server load. The experiments show that the CMTS more realistically feedbacks the server load status than the least connections. As the number of cluster server connections and message sending rate increase, the average cluster response time is shorter
15:45-16:00 August 21st	**T1003:** Preparation of endothermic highly hydrophobic anti-icing materials and their anti-icing properties **Presenter:** ***Yongjing Peng,*** State Grid Hunan Electric Power Company,China **Abstract:** In this paper, the solar spectrum selective endothermic coating with CoCuMnOx as the light absorbing pigment is prepared to absorb sunlight efficiently. After optimizing the thickness of the coating, the endothermic coating material with absorptivity of 0.928 and emissivity of 0.198 is obtained. The roughness value of the coating is 0.64 μm, which ensures that the coating has a higher sunlight absorption rate without the need for an antireflection layer. Icing flashover tests were carried out on insulators coated with endothermic highly hydrophobic anti-icing materials. The ice lightning voltage of ceramic insulators (3 pieces) was increased by 13.68%, and that of glass insulators (2 pieces) was increased by 22.96%. Compared with ceramic insulators, glass insulators coated with anti-icing materials have better protection effect.
16:00-16:15 August 21st	**T1004:** Research on the Development of the Ubiquitous Power Internet of Things **Presenter:** ***Zhou Lidan,*** Shanghai Jiao Tong University, China **Abstract:** The dawn of the new century has witnessed the tremendous advancement of society. In response to the requirement of the progress of technologies and enterprise development, the Ubiquitous power Internet of things (UPIOT) is boosting to develop and playing a significant role in China's power grid which not only connects all aspects of the power system, bus also promotes the application and innovation of various new techniques to achieve green and

	healthy progress. This paper analyses in detail the concept, construction goals and existing problems of the UPIOT. Besides, the key technologies that contain the big data, cloud computing, 5G and artificial intelligence are also proposed. Furthermore, it offers some suggestions to accelerate the development of UPIOT.
Technical Session II	
15:30-15:45 August 21st	**T2019:** Electricity Prediction under Edge Devices Based on Sparse Anomaly Perception **Presenter:** ***Jun Yang,*** University of Electronic Science and Technology of China, China **Abstract:** Energy issues are closely related to human development. With the changes of the times and the rapid development of technology, power energy has become one of the indispensable energy in human social life, and is the most important part of energy field in modern society. Electricity prediction, as the basis for power system operation, optimization, and control, is facing new challenges in today's rapidly evolving energy system environment. A large number of machine learning technology and deep learning technology have been applied to electricity prediction and achieved good results. In the edge computing environment, anomalous data collection is characterized by sparsity and time window, and machine learning regression algorithms are often affected by anomalous data. Electricity prediction under edge devices based on sparse anomaly perception is proposed, which combines the drop out idea and subsample idea to alleviate the above problems to some extent. And it can achieve faster training and more accurate prediction.
15:45-16:00 August 21st	**T2020:** Physical Layer Secure Data Transmission for Mobile Edge Computing: Beamforming and Artificial Noise **Presenter:** ***Jie Tang,*** University of Electronic Science and Technology of China, China **Abstract:** As increasing threat to wireless data communication for mobile edge computing and high cost of conventional encryption implement in wireless environments, the physical layer security has aroused widespread concern to increase the security of data transmission in mobile edge computing. However, too much idealistic and unrealistic assuming in this area’s research result in security can hardly guarantee in the reality. This paper proposed a secure communications for mobile edging computing, which is using the sequcece combining with physical layer beamforming and artificial noise. By contrast to conventional schemes, the proposed scheme could enhance the security with probability 1 in two adverse situation. An advantage of the proposed scheme is that the upper layer can help the physical layer to defend each other, while up-layer system break by opponent, natural randomness of physical channel will play role to ensure system safety. We conduct simulations to verity the effectiveness of the proposed scheme for mobile edging computing.

16:00-16:15 August 21st	**T2021:** Secure Data Communication for Wireless Mobile Edge Computing Based on Artificial Noise and Security Code **Presenter:** ***Jie Tang,*** University of Electronic Science and Technology of China, China **Abstract:** As increasing threat to wireless mobile edge computing communication and high cost of conventional encryption implement in wireless mobile edge computing environments. The physical layer security has aroused widespread interests to increase the secure transmission and communications of mobile edge computing data communication in wireless networks. This work investigates the mobile edge computing secure communication by MIMO beamforming and artificial noise (AN) system with secure code. From practical consideration, in this work, we consider a coded system and investigate its achievable secrecy rate under the realistic wiretap code with limited code length and modulation. We proposed the mobile edge computing secure transmission scheme which could make almost zero information obtained by the unknown eavesdroppers with keeping certain quality of BER performance for the main channel simultaneously. The simulation results verify this proposed mobile edge computing secure transmission scheme performance. It shows great implement ability.

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