icWCSN 2021

2021 8th International Conference on Wireless Communication and Sensor Networks

WCCCT 2021

2021 World Conference on Computing and Communication Technologies

23-25 JANUARY, 2021 | DALIAN, CHINA

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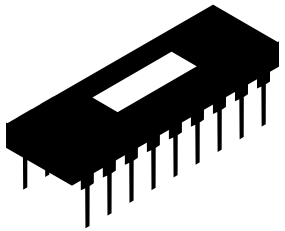

Welcome Message

On behalf of Conference Committees, we welcome you to attend the 2021 World Conference on Computing and Communication Technologies (WCCCT 2021) and 2021 8th International Conference on Wireless Communication and Sensor Networks (icWCSN2021), which were supposed to be held in Dalian, China.

It is a great pity that we cannot communicate face to face due to the outbreak of the COVID-19. Thereby, we have to hold this conference online. From a practical perspective, there are some benefits for holding the online conferences. It mainly allows attendees to avoid crowd contact and effectively prevent virus infection. We believe that the online conference can also provide a unique experience for all participants. We hope all is well with you and your family. Meanwhile, we would sincerely appreciate for your understanding and cooperation.

The conference has been planned so that students from academic institutions, experts from industries and academia take part in the conference and share their experiences in Computing and Communication Technologies, as well as Wireless Communication and Sensor Networks. Our field is enriched by the dialogue among colleagues from around the world which occurs during presentation sessions as well as informal conversations. We hope this is a memorable and valuable experience for you, and that you will enjoy discovering the research, practical knowledge, and personal contacts available to you.

Many members of the organizing team worked very hard to turn our initial visions for this conference into reality, we would like to warmly thank all organizing committee members for their dedication before and after this unique event. Your expertise, enthusiasm, and time commitment enabled us to prepare the final program. Our Final thanks would go to the authors, thanks for your support to our conferences.

We hope that all participants and other interested readers benefit from and enjoy the presentations and proceedings and also find it stimulating in this process. We pursue higher and better international conference, your suggestions and comments are welcome.

WCCCT 2021 & icWCSN2021
Conference Organizing Committee

Presentation Tips

Meeting ID: 650 2343 4300

Meeting Room Link: https://zoom.com.cn/j/65023434300

The meeting room will be opened 30 minutes before the meeting starts.

Please enter the room 10-15 minutes in advance.

Zoom Download:

https://zoom.com.cn/download (**For Chinese Authors**)

https://zoom.us/ (**For Overseas Authors**)

Zoom Guideline Download: Click

Online Presentation Instruction:

-Please prepare the PPT file of your presentation on your laptop in advance.

-Duration of each Presentation: about 12 Minutes of Presentation and 3 Minutes of Q&A.

-Presentation certificate will be sent to presenters after conference by email.

-An excellent presentation will be selected from each session and announced on the website after conference. An excellent presentation certificate will be sent after conference by email.

-During the conference, if you have any question, please contact “Inquiry-Assistant” privately, you’ll get assisted immediately.

- For more information about the conference, please scan QR Code to follow our Official Account and add us on Wechat.

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Please rename yourself before entering the conference room as below:
Author: Paper ID-Name
Listener: Listener-Name
Keynote Speaker: Keynote-Name
Conference Committee: Position-Name

Testing Timetable

JANUARY 23, 2021 | Beijing Time(GMT+8)

Test Room ID: 650 2343 4300

Test Session	Test Time
Session 1 C0003 C0011 C0013 C0015 C0016 C0024 C0027 C1002	**10:00-11:00**
Session 2 C0001 C0002 C0007 C0017 C0020 C2004 C2005 C2009	**14:00-15:00**
Session 3 C0008 C0019 C0023 C1001 C2001 C2002 C2006 C2008	**15:00-16:00**

Conference Agenda

Day 1 January 24, 2021 | Beijing Time(GMT+8)

Time	Schedule (Room ID: 650 2343 4300)
09:30-9:40	**Opening Remarks** Prof. Krzysztof Szczypiorski, Warsaw University of Technology, Poland
09:40-9:50	**Welcome Message** Prof. Hongxi Yin, Dalian University of Technology, China
9:50-10:35	**Keynote Speech I** Prof. Teng Joon Lim, Faculty of Engineering, The University of Sydney, Australia Topic: Security of Networked Cyber-Physical Systems – Beyond Attack Detection and Classification
10:35-11:20	**Keynote Speech II** Prof. Leopoldo Angrisani, University of Napoli Federico II, Italy Topic: Uncertainty for Big (Measurement) Data
11:20-11:30	**Break Time & Group Photo**
11:30-11:50	**Invited Speech I** Prof. Miaomiao Liu, Northeast Petroleum University, China
11:50-13:30	**Break Time**
13:30-15:30	**Session 1--Communication theory and technology** C0003 C0011 C0013 C0015 C0016 C0024 C0027 C1002
15:30-15:45	**Break Time**
16:45-16:10	**Invited Speech II** Prof. Dr.-Ing. Paolo Mercorelli, Leuphana University of Lueneburg, Germany
16:10-18:10	**Session 2--Wireless Transmission and Communication Engineering** C0001 C0002 C0007 C0017 C0020 C2004 C2005 C2009

Conference Agenda

Day 2 January 25, 2021 | Beijing Time(GMT+8)

Time	Schedule (Room ID: 650 2343 4300)
10:00-12:00	**Session 3--Communication and signal processing** C0008 C0019 C0023 C1001 C2001 C2002 C2006 C2008
11:45-14:00	**Break Time**
14:00-15:30	**Keynote Speech Replay**

Keynote Speaker I

Prof. Teng Joon Lim

IEEE Fellow
Associate Dean (Education)
Faculty of Engineering, The University of Sydney, Australia

Teng Joon (T. J.) Lim (S'92-M'95-SM'02-F'17) obtained the B.Eng. degree in Electrical Engineering with first-class honours from the National University of Singapore (NUS) in 1992, and the Ph.D. degree from the University of Cambridge in 1996. From September 1995 to November 2000, he was a researcher at the Centre for Wireless Communications in Singapore, one of the predecessors of the Institute for Infocomm Research (I2R). From December 2000 to May 2011, he was Assistant Professor, Associate Professor, then Professor at the University of Toronto's Edward S. Rogers Sr. Department of Electrical and Computer Engineering. From June 2011 to January 2020, he was a Professor at the Electrical & Computer Engineering Department of NUS, where he served as a Deputy Head from July 2014 to August 2015. From September 2015 through December 2019, he served as Vice-Dean (Graduate Programs) in the NUS Faculty of Engineering. Since January 2020, he has served as Deputy Dean and Associate Dean (Education) at the Faculty of Engineering in the University of Sydney. Professor Lim is an Associate Editor for IEEE Potentials, was an Area Editor of the IEEE Transactions on Wireless Communications from September 2013 to September 2018, and previously served as an Associate Editor for the same journal. He has also served as an Associate Editor for IEEE Wireless Communications Letters, Wiley Transactions on Emerging Telecommunications Technologies (ETT), IEEE Signal Processing Letters and IEEE Transactions on Vehicular Technology. He has volunteered on the organizing committee of a number of IEEE conferences, including serving as the TPC co-chair of IEEE Globecom 2017. He chaired the Singapore chapter of the IEEE Communications Society in 2017 and 2018, and is a Distinguished Lecturer of the IEEE Vehicular Technology Society for 2019-20. He was also a co-winner of the IEEE Communications Society's 2020 Heinrich Hertz Award for Best Communication Letter.

His research interests span many topics within wireless communications, including cyber-security in the Internet of Things, heterogeneous networks, cooperative transmission, energy-optimized communication networks, multi-carrier modulation, MIMO, cooperative diversity, cognitive radio, and stochastic geometry for wireless networks, and he has published widely in these areas.

Speech Title:

Security of Networked Cyber-Physical Systems – Beyond Attack Detection and Classification

Abstract:

Cyber-physical systems are controlled through a feedback loop that links its sensors, controllers and actuators, often through a wireless communication network. Disruptions to the network can seriously impair the operations of a CPS, and therefore attacks such as selective forwarding can be highly effective, though they may be relatively unsophisticated from a technical standpoint. In the last several years, the networking community has made progress in the detection and classification of such attacks – one example from the speaker's own research into early malware detection using a machine learning classifier will be briefly described. However, in this talk we will focus our attention on the inadequacy of merely detecting and classifying attacks, and outline some of the efforts made in the automatic control community to design control methods that are resilient to certain types and levels of attack, which are themselves also inadequate due to the unrealistic assumptions made about the communication network. We will look ahead and postulate that a reinforcement learning approach to first modelling, and then detecting and adapting to attacks on networked CPS may be fruitful. As our research on this topic is still in its infancy, no concrete results, only research ideas, will be presented to challenge researchers in the communications and computing domains to develop control methods that are practically useful in the cyber-physical world.

Keynote Speaker II

Prof. Leopoldo Angrisani

IEEE Fellow
Chair IEEE Instrumentation & Measurement Italy Chapter
University of Napoli Federico II, Italy

Leopoldo Angrisani is Full Professor of Electrical and Electronic Measurements with the Department of Information Technology and Electrical Engineering of the University of Naples Federico II, Italy. He is also General Manager/Director of CeSMA – Center of Advanced Measurement and Technology Services and member of the Board of the Ph.D. Program on Information Technology and Electrical Engineering of University of Naples Federico II. His research activity is currently focused on communication systems and networks test and measurement; measurements for Internet of Things applications; compressive sampling based measurements; measurements for Industry 4.0; measurement uncertainty.

He was and is currently involved in many industrial research projects, in cooperation with small, medium and great enterprises, for which he played and is currently playing the role of scientific coordinator. He is currently playing a relevant role in designing and developing the strategic pillars on which the national Competence Center on Industry 4.0, MedITech, led by Federico II University and geographically located in the South of Italy, is going to be based.

He is Fellow Member of the IEEE Instrumentation and Measurement and Communications Societies, Chair of the IEEE Instrumentation & Measurement Society Italy Chapter, Honorary Chairman of the first edition (M&N 2019) of the IEEE International Symposium on Measurements & Networking 2019, General Chairman of the second edition (MetroInd4.0&IoT 2019) of the IEEE International Workshop on Metrology for Industry 4.0 and IoT 2019. He was one of the promoters of the TC-37 “Measurements and Networking” technical committee of the IEEE Instrumentation & Measurement Society and General Chairman of the first (M&N2011), second (M&N2013), third (M&N2015) and fourth edition (M&N2017) of the IEEE International Workshop on Measurements & Networking. He is Representative of Italy in the IEC Validation Team-VT 60050 for maintenance and management of the International Electrotechnical Vocabulary and member of the Italian Association “GMEE-Electrical and Electronic Measurements Group”, of CNIT, National Inter-university Consortium for Telecommunications, of the Technical Committee CT 1/25 “Terminology, Quantities and Units” of CEI (Italian Electrotechnical Committee).

Speech Title:
Uncertainty for Big (Measurement) Data

Abstract:
The idea of Big Data stems from the fast-growing size and availability of data sets resulting from the huge sensing, storage, computation, and transmission capabilities offered by current Information Technolog systems. The expression “Big Data” generally indicates a data set that is so large, often heterogeneous in nature (e.g., text, audio, images, video), complex and poorly structured that it becomes difficult to extract useful information from them by using traditional computational methods.

While the concept of Big Data is well established, so far, the focus has mostly been on the “data per se”, on gathering a massive amount of data, on the technologies and devices employed to collect the data. Instead, aspects like the “quality” of data are often disregarded.

However, because one major applications of Big Data is in Decision Making systems, the quality of data may have a strong impact on the overall reliability of the results: basically, poor information quality can lead to wrong decisions. It follows that guaranteeing an adequate quality of input information is crucial for reducing the risk of making wrong decision.

In this regard, metrology (i.e., the “science of measurement and its application”) represents an important tool for characterizing the quality of the available data and for dignifying them as “information”. In fact, a metrological approach to Data can help in identifying the contributions that limit the quality of information quality and quantifying their effect on the reliability of Big Data-based Decision-Making systems.

Starting from these considerations, this talk will introduce to the fundamental concepts of metrology, measurement uncertainty, and “quality of measurement data”. Also, it will highlight the open challenges and future directions of the effect of uncertainty sources on the confidence of the conclusions drawn by Big Data-based Decision-Making system. Finally, the talk will show how a sound knowledge of measurement fundamentals can allow to manage the risk of making wrong decisions.

The lecture will lead the audience to wonder: should we pursue big data volumes, yet at the cost of quality of information, or can we settle for “smaller” amount of Big Data, but preserving their quality? To which extent the quality of data can compensate for the scarcer amount of data? While the talk may not provide a definitive response to these open questions, it will certainly provide the audience with the tools to ponder this dilemma and consciously find the relevant answer in the case at hand.

Invited Speech I

Link Prediction in Signed Social Networks Based on Clustering Coefficient and Sign influence

Prof. Miaomiao Liu, Northeast Petroleum University, China

Abstract:
Compared with other routing protocols, the GPSR routing protocol has better performance in the UAV ad-hoc networks. However, in the TDMA-based UAV ad-hoc networks, whether the next-hop node can forward data packets in time depends on the “time slot distance” between the next-hop node and the forwarding node, which may cause delay jitter. In order to better apply the GPSR routing protocol to the TDMA-based network and improve the latency performance, this paper proposes an improved GPSR routing protocol (TD-GPSR) based on the cross-layer thinking. In the TD-GPSR algorithm, when routing, in addition to considering the spatial distance between the next-hop node and the destination node, the “time slot distance” between the next-hop node and the forwarding node is also considered. By weighting these two influencing factors separately and further calculating, a quantity called “space-time distance” is obtained. The neighbor node with the smallest “space-time distance” will be selected as the next-hop node. The simulation results show that the average end-to-end delay of TD-GPSR is effectively reduced. In addition, the packet loss rate of TD-GPSR is also significantly lower than that of GPSR.

Invited Speech II

Prof. Paolo Mercorelli

Distinguished Professor of Control and Drive Systems

Leuphana University of Lueneburg (Germany)

Paolo Mercorelli received the M.S. degree (Laurea) in Electronic Engineering from the University of Florence, Florence, Italy, in 1992, and the Ph.D. degree in Systems Engineering from Alma Mater Studiorum University of Bologna, Bologna, Italy, in 1998. In 1997, he was a Visiting Researcher for one year in the Department of Mechanical and Environmental Engineering, University of California, Santa Barbara, USA. He was awarded by the Marie Sklodowska-Curie Actions Research Fellowship Programme sponsored by The European Commission in year 1998 which he spent in ABB (Asea Brown Boveri) Corporate Research Heidelberg until 2001. From 2002 to 2005, he was a Senior Researcher with the Institute of Automation and Informatics, Wernigerode, Germany, where he was the Leader of the Control Group. From 2005 to 2011, he was an Associate Professor of Process Informatics with Ostfalia University of Applied Sciences, Wolfsburg, Germany. In Wolfsburg, he was involved in various projects with the Volkswagen AG Research Center. In 2009 he was Visiting Professor at the German University of Cairo and in 2011 he was a Visiting Professor at Villanova University, Philadelphia, USA. Since 2012 he has been a Distinguished Full Professor (Chair) of Control and Drive Systems at the Institute of Product and Process Innovation, Leuphana University of Lueneburg, Lueneburg, Germany. Since 2018 he has obtained an International Distinguished Visiting Professor Fellowship at the Institute of Automatic Control of Lodz University of Technology (Poland).

A Real Application of a Fuzzy Based Control Strategy for a Nonholonomic Car-like Robot

Abstract:

This presentation deals with the control problem for nonholonomic wheeled mobile robots moving on the plane, and in particular, the use of a Fuzzy controller technique for achieving a given motion task which consists of a following rectilinear trajectory until an obstacle occurs on the path. Starting with a background part, in which the fundamental knowledge of nonholonomic systems is presented, the considered model is shown. After a short introduction on Fuzzy control background, the problem of the avoidance of an obstacle is taken into consideration. When an obstacle occurs on the path, the designed drive assistant provides for its avoidance calculating the minimal distance from which the avoidance maneuver starts. Conditions on the parameters of a PD controller are calculated using a Fuzzy based approach. An observer is designed to obtain unmeasurable states to be used in the control loop. Moreover, a formal demonstration of a Proposition is provided in which the convergence of the proposed system state estimation using a nonlinear observer is shown. Results considering a real transporter vehicle for a storage service are shown.

Session 1

13:30-15:30 January 24, 2021 | (GMT+8)

Topic:
Communication Theory and Technology
Session Chair:
Assist. Prof. Dr. Mervat Mohamed, Ajman University, UAE

Zoom ID: 65023434300 Zoom Link: https://zoom.com.cn/j/65023434300

Multi-population genetic algorithm-based attack path discovery research in large scale networks
Author(s): Hu Tairan, Gao Wenlong, Zhou Tianyang, Zang Yichao
Presenter: Wenlong Gao, National Key Laboratory of Mathematical Engineering and Advanced Computing, China

C0003
13:30-13:45

Abstract: with the growth of network scale, present researches on the attack path discovery often encounter the problem of search space explosion that results in fails. To tackle the problem of attack path discovery for large-scale networks, this paper proposes a bi-population genetic algorithm for the attack path discovery in large-scale networks. Firstly, this paper represents the connective relationship between hosts as vectors and uses the Balanced Iterative Reducing and Clustering Using Hierarchies (Birch) algorithm to realize network decomposition. Then, the attack path discovery problem is encoded based on the decomposition result, and the bi-population mechanism is introduced to find the attack path. The experiment result shows that our algorithm performs better than Metric-FF and SGA in optimization and efficiency.

An Elephant flows Scheduling Method Based on Feedforward Neural Network
Author(s): Pan Zuo, Yongan Shu
Presenter: Pan Zuo, College of Computer Science & Technology, Anhui University, China

C0011
13:45-14:00

Abstract: In order to solve the problem of unbalanced network load caused by elephant flows in the data center network, a dynamic multi-path load balancing method based on feedforward neural network (FNN-LB) was proposed. In this method, topological perception and traffic information monitoring are carried out first, and the elephant flows are marked. The collected network traffic information is then used as input to estimate the load of each link through the feedforward neural network. Finally, the optimized ant colony algorithm is used to find the optimal paths for transmitting the elephant flows, so that the optimal paths are selected according to the real-time status of the links. Simulation results show that the proposed scheme can effectively reduce network transmission delay and packet loss rate, and improve link utilization.

Session 1

C0013 **14:00-14:15**	Research and Comparison of Random Forests and Neural Networks in Shanghai and Shenzhen Financial 20 Index Prediction Author(s): Cai-Yu Su, Yuan Lei, Mei-Xia Wang Presenter: Yuan Lei, Guangxi University of Foreign Languages, China Abstract: Machine learning has made great achievements in the field o f a rtificial in telligence, es pecially in th e financial industry, which has shown great potential and attracted the attention of the academia and the industry. With the opening of the capital market to the outside world, how to achieve more accurate forecast of the trend of stock index and timely carry out reasonable risk control is one of the important issues concerned by investors. On the basis of literature and theoretical analysis, the public data sets of a well-known securities firm is selected to make predictions of the Shanghai and Shenzhen CSI 20 index based on neural networks and random forest models. The average absolute error (MAE) was then used as a metric to compare the performance of the two machine learning algorithms on the stock index prediction problem. The results show that the model constructed by the random forest algorithm performs better on this problem. Therefore, we believe that making investment decisions based on the results can help investors make effective investment decisions under certain risks.
C0015 **14:15-14:30**	An Automatic Test Sequence Generation Method based on Markov Chain Model Author(s): Liting Sun, Shiwei Gao, Lin Wang Presenter: Liting Sun, School of Space Information, China Abstract: Software statistical testing, which draws test sequences based on the Markov chain usage, has been proved to be an effective strategy in improving software reliability. There are two main concerns while constructing test Markov chain in statistical testing of software, how to define a reasonable test adequacy criteria and how to generate test sequences both automatically and efficiently. Several strategies have been proposed in literatures to address these problems. However they are not as efficient as desired because of a couple of reasons upon our investigation. First of all, the existing test adequacy criteria are not able to guarantee the full path coverage for the Markov chain usage. Second, the current strategies on generating test sequences are lack of efficiency. Third, they are limited to deal with relatively small size of the Markov chain usage. In this paper, we resolve two main problems in statistical testing of software to meet high software reliability. We address an optimized test adequacy criteria with corresponding proof to guarantee the generated test sequences to cover the full path for the Markov usage Chain. Furthermore, we propose a novel deterministic greedy algorithm with faster convergence speed for constructing test sequences. We then explore applications of simulated annealing (SA), roulette as well as our greedy algorithm based on the optimized test adequacy criteria. Our experimental results show the advantages of our method in generating reasonable size of test sequences, and the ability of generating test sequences for cases with larger scale.
C0016 **14:30-14:45**	Deep Reinforcement Learning in Networks for Resource Scheduling Author(s): Yichen Che，Fei Lin，Jiemei Liu Presenter: Yichen Che, Qilu University of Technology, China

Session 1

Abstract: The main traffic of cellular networks is Machine-type Communication (MTC), when a large number of machine type communication devices (MTCDs) request to access the network, it will be overloaded. Some basic scheduling algorithms, such as first-come, first-served algorithm, higher priority algorithm, cannot fully solve the multi-resource scheduling problem. So, in this paper, the resource management problems in Machine-to-Machine (M2M) communication were usually regarded as difficult online decision-making tasks by transforming the packing tasks with multiple resource requirements into a deep reinforcement learning problem. The design of an optimized deep neural network will make to the learning curve converges better. Compared with the RL algorithm, the Deep Reinforcement learning (DRL) algorithm proposed in this paper has a better convergence speed, so it is more suitable for Machine-to-machine(M2M) communication scenarios, it can ensure data fluidity and scheduling efficiency.

C0024
14:45-15:00

Using Technology in smart and Intelligent Food Packages as a communicational Tool with consumers
Author(s): Dina Elkhattat and Mervat Medhat
Presenter: Dina Elkhattat and Mervat Medhat (Assist. Prof., College of Mass Communication, Ajman University. Assoc. Prof., Art & Design Academy, the higher institution of applied art

Abstract: This exploratory research aims to track the recent trends in food packaging design, through multiple case studies, to examine the core concepts of creative packaging and the implementation of the recent technology in the packaging industry. The research focuses on technology and its impact on design, functionality, and user experience, to highlight recommendations that could help designers and marketers to determine the essential information and elements in packaging. Also, to consider the possibility of using these new trends to stimulate, attract, and convince customers, and motivate their buying behavior and decision-making. The study also emphasizes the vast role of the smart and intelligent package to increase the interaction with consumers and help them to ensure the quality of the product and interact with them technologically through sensors of the active packaging. The researchers suggest that companies and designers should design packages in line with the consumers' experience process and invest in the smart packages to increase interaction in three main stages, sensation, Attraction, and Functionality; to raise consumers satisfaction, especially through smart technology. Moreover, to reduce the amount of food waste and support recycling, by connecting them through their smartphone to review the detailed information in that context.

C0027
15:00-15:15

Application of Machine Learning In Network Security Situational Awareness
Author(s): Zhao Yifan
Presenter: Zhao Yifan, Qingdao Institute of Technology, College of Information Engineering, China

Abstract: Along with the advance of science and technology, the informationization society construction is gradually perfect. The development of modern information technology has driven the growth of the entire network spatial data, and network security is a matter of national security. There are several countries included in the national security strategy, with the increase of network space connected point, traditional network security space processing way already cannot adapt to the demand. The machine learning can effectively solve the problem of network security. Around the machine learning technology applied in the field of network security research results, this paper introduces the basic concept of network security situational awareness system, the basic model, and system framework. Based on machine learning, this paper elaborates the network security situation awareness technology, including data mining technology, feature extraction technology and situation prediction technology. Recursive feature elimination, decision tree algorithm, support vector machine, and future research direction in the field of network security situational awareness are also discussed.

Session 1

Development and Application of Multi Purpose Gateway for Swarm Intelligent Building

Author(s): Zexin Zhang, Lun Li, Liang Zhao, Tianyi Zhao
Presenter: Zexin Zhang, School of Control Science and Engineering, Dalian University of Technology, China

C1002
15:15-15:30

Abstract: Aiming at the problem of the architecture of the automation control system of traditional buildings, Tsinghua University proposed swarm intelligence building technology. However, most of the electrical equipment in completed buildings is not designed for swarm intelligence technology, and a large number of heterogeneous devices can’t communicate with Swarm Intelligence Computing network platform, which leads to the difficulty of the system promotion. This paper develops a multi-purpose gateway for swarm intelligence. On the basis of solving the data interaction between terminal equipment of swarm intelligence control system and computing network, it reduces the requirement of network bandwidth through pre-processing of data, and completes the feasibility test of gateway in lighting unit.

Session 2

16:10-18:10 January 24, 2021 | (GMT+8)

Topic:
Wireless Transmission and Communication Engineering
Session Chair:
Prof. Dr.-Ing. Paolo Mercorelli, Leuphana University of Lueneburg, Germany

Zoom ID: 65023434300 Zoom Link: https://zoom.com.cn/j/65023434300

C0001 **16:10-16:25**	Linear Cooperative Localization Algorithm with TOA /AOA / AOD and Multipath Author(s): Shixun Wu, Qiang Feng, Wenxian Huang, Kai xu Presenter: Qiang Feng, Information Science and Engineering College, Chongqing Jiaotong University, china Abstract: In this paper, a new linear cooperative localization algorithm with one-bound scattering paths is proposed. By using time of arrival (TOA), angle of arrival (AOA), and angle of departure (AOD) estimate parameters of signal between the mobile station (MS) and the base station (BS), we derive a weighted linear least square algorithm with error analysis and obtain the location estimate of MS and the corresponding covariance matrix estimate of MS. Further, a linear cooperative localization algorithm is formed by transforming the nonlinear distances among MSs into linear ones with one-order Taylor expansion of four dimension, and considering the estimate error of the cooperative MSs. Simulation results illustrate that the proposed algorithm can significantly improve the localization accuracy, especially when the number of multipath and the cooperative MSs is large.
C0002 **16:25-16:40**	A fusion algorithm which can reduce PAPR and redundancy Author(s): Jian'e Dong， Yu'rui Xie Presenter: Jian'e Dong， College of Big Data and Intelligence Engineering, Southwest Forestry University, China Abstract: The precoding method based on pulse forming reduces the effect of the OFDM system on PAPR, but also introduces a large amount of redundant information, which reduces the frequency band utilization of the system. In order to further improve the PAPR of OFDM system value, and reduce the redundancy of the system, this paper proposes a grouping optimization selection of SLM algorithm, Combining it with the precoding method can reduce the redundant information of the system while reducing PAPR greatly. Theoretical analysis and experimental results show that the new SLM and precoding fusion algorithm for redundant information is far lower than the traditional fusion algorithm, under the condition of the same PAPR values.

Session 2

C0007 **16:40-16:55**	Research on Key Distribution and Encryption Control System of Optical Network Physical Layer Author(s): Cui Chen, Yang Zhe, Yang Siyu, Cheng Tao ,Jiang Liqiong, Wang Xiangqing Presenter: Yang Siyu, Beijing University of Posts and Telecommunications, China Abstract: With the wide application of large-capacity and high-speed optical networks, its security has become a current research focus. Due to the limitations of traditional key distribution and encryption schemes, this paper proposes an innovative key distribution and encryption control scheme based on physical layer channel feature extraction and analysis. First of all, the transceiver terminal extracts the physical characteristics of the fiber channel separately, and generates a consensus key through quantization coding. Second, use the generated key base to encrypt the transmission sequence, map the Quadrature Phase Shift Keying (QPSK) signal to the high-order 1024×1024-QAM signal, and use the noise stream to perform the high-order QAM. The signal is flooded. The system utilizes channel non-replication and randomness of channel noise, the security and randomness of the key are good, and the key formation rate is high and the key generation equipment is simple. The system uses high-order QAM modulation, which increases the security of the system. The experimental results show that the coding rate of the key generated by the system reaches 400kb/s, and the coding performance of the key is better; the operating key is generated by the key base extension, which has strong anti-interception ability; the system has a low bit error rate and secure transmission Good performance.
C0017 **16:55-17:10**	A Mobility Management Method for Space-earth Integration Network Based on Identity Mapping System Author(s): Ming Liu,Hongchao Wang, Huachun Zhou,Yuhong Xiang Presenter: Ming Liu, Beijing Jiaotong University, China Abstract: The space-earth integration network based on the identity mapping system can take into account both the advantages of the space-earth integration network and the identity mapping network. It can achieve a wide range of seamless coverage and information exchange and solve the ambiguity problem of IP address caused by traditional network through the separation of location and identity. Due to the time variation of the space-earth integration network framework and the difference between the identity mapping system and the traditional network, the current satellite network mobility management methods have the problems of high handover delay and large packet loss rate. Aiming at this phenomenon, this paper proposes a mobility management method for realizing the low delay and the high-reliability on the space-earth integration network. The results of simulation experiments show that the mobility management method solves the problems of high overhead and low reliability caused by mobile handover in the space-earth integration network based on the identity mapping system, and ensures the stability of the space-earth integration network.
C0020 **17:10-17:25**	Improvement of GPSR Routing Protocol for TDMA-based UAV Ad-Hoc Networks Author(s): Yanzhong Gao, Jielin Fu and Yi Lu Presenter: Yanzhong Gao, Guilin University of Electronic Technology, China

Session 2

	Abstract: Compared with other routing protocols, the GPSR routing protocol has better performance in the UAV ad-hoc networks. However, in the TDMA-based UAV ad-hoc networks, whether the next-hop node can forward data packets in time depends on the “time slot distance” between the next-hop node and the forwarding node, which may cause delay jitter. In order to better apply the GPSR routing protocol to the TDMA-based network and improve the latency performance, this paper proposes an improved GPSR routing protocol (TD-GPSR) based on the cross-layer thinking. In the TD-GPSR algorithm, when routing, in addition to considering the spatial distance between the next-hop node and the destination node, the “time slot distance” between the next-hop node and the forwarding node is also considered. By weighting these two influencing factors separately and further calculating, a quantity called “space-time distance” is obtained. The neighbor node with the smallest “space-time distance” will be selected as the next-hop node. The simulation results show that the average end-to-end delay of TD-GPSR is effectively reduced. In addition, the packet loss rate of TD-GPSR is also significantly lower than that of GPSR.
C2004 **17:25-17:40**	A FAST SCHEME FOR WIRELESS SENSOR NETWORK ACCESS TO IPV6 Author(s): JIEBAO HOU, YUNHUI BAI, ZHE DONG, YUANMING WU Presenter: Jiebao Hou, School of Optoelectronic Science and Engineering, University of Electronic Science and Technology of China, China Abstract: 6LoWPAN, which realizes the seamless connection between the IP control network and wireless sensor network. Therefore, we propose a fast scheme of wireless sensor networks access to IPv6 in this paper based on 6LowPAN. Through the design of software and hardware, the network can fast access IPv6. The multi-node, large-scale wireless sensor network and IP wired network are seamlessly connected and data exchange can be realized. That can meet the application requirements of sensor network point-to-point, data exchange, and command issuing among different networks.
C2005 **17:40-17:55**	Design of Environmental Monitoring and Control System for Greenhouse Based on Long Range Wireless Technology Author(s): Yang Ou, Chunyan Ma, Yanzhao Hao Presenter: Yang Ou, Taiyuan University of Technology, China Abstract: Aiming at the problems of large greenhouse environment, such as large range, large amount of data and complex communication cables, a sensor network based on long distance, low power consumption and wireless transmission technology was designed. Sensor network system optimally designs the size of LoRa terminal node, reduces the power consumption of the node. On the basis of self-organizing network, the wireless communication strategy based on time division multiple access multiplexing technology(TDMA) is adopted to reduce the probability of channel collision in wireless transmission and improve the reliability of data transmission and channel utilization while ensuring LoRa transmission network connectivity and effective monitoring range. In the actual test, when it is 500m away from the gateway and the terminal quickly uploads data, the packet loss rate is reduced by 11%. In addition, one growth cycle of plants was monitored in the greenhouse, and the changes of environmental parameters in the greenhouse were demonstrated. MATLAB simulation fuzzy PID control strategy is adopted to test the feasibility of the control strategy in the greenhouse, which lays a foundation for the subsequent control.

Session 2

C2009
17:55-18:10

Using Poincare Plots for Feature Extraction of the Dynamics of Electromagnetic Field Exposures when Using Different Protocols of Wi-Fi Communications

Author(s): Simona Miclaus, Annamaria Sarbu, Paul Bechet
Presenter: Simona Miclaus, Nicolae Balcescu Land Forces Academy, Sibiu, ROMANIA

Abstract: Wi-Fi network devices emit electromagnetic radiation which is of interest for human exposure safety. Based on the quasi-stochastic time-variability of such signals emitted in two different protocols belonging to the 4th and the 5th generations, namely IEEE 802.11 - n and ac, we demonstrate here that specific temporal patterns can be extracted from the time series, if we use the representation of Poincare plots. Practically, the main parameters of the Poincare ellipses are different for the two communication protocols, directions of data transmission and bandwidths used. When energy density per transferred bit was computed, it was also revealed that there is a linear relationship between this one and the Poincare ellipse area. Based on the mean electric field strengths measured near a Wi-Fi device by directly collecting the amplitude probability density traces of the emitted powers, one can extract the features of short- and long-term exposure profile variations in different wireless data transmission configurations.

Session 3

10:00-12:00 January 25, 2021 | (GMT+8)

Topic:
Communication and signal processing
Session Chair:

Zoom ID: 65023434300 Zoom Link: https://zoom.com.cn/j/65023434300

C0008 **10:00-10:15**	Minimum-Variance Importance Sampling Estimator for Fast Simulation of Linear Block Codes over Binary Erasure Channels Author(s): Jinzhe PAN, Wai Ho MOW Presenter: Jinzhe PAN, Hong Kong University of Science and Technology, China Abstract: In this paper, the problem of efficiently evaluating the error performance of linear block codes over binary erasure channels (BECs) is considered. We propose a novel importance sampling (IS) estimator by deriving the optimal IS distribution of the erasure pattern size. Consequently, a corresponding iterative algorithm for fast simulation purpose is proposed. The effectiveness of the proposed IS algorithm compared to Monte Carlo simulation is demonstrated in estimating the block erasure rate of low-density parity-check codes, and IS gains of almost ten orders of magnitude is achieved.
C0019 **10:15-10:30**	Research on the Separation Method of LFM Signal Based on VMD-FastICA Author(s): Qiubing Cheng, Tao Chen, Yu Lei Presenter: Qiubing Cheng, Harbin Engineering University, China Abstract: In order to solve the problem of single-channel separation of LFM signals, a method based on variational mode decomposition (VMD) and fast independent component analysisis (FastICA) proposed to separate signals. Firstly, we set the secondary penalty factor required by VMD and the number of signals. Secondly, the modal component signals are obtained by VMD. Finally, the FastICA separation algorithm is used to reconstruct and obtain the source signal. The simulation results show that the VMD can effectively separate the source signals, and the separation effect is better than the empirical mode decomposition (EMD) in single-channel blind source separation algorithm.

Session 3

C0023 **10:30-10:45**	A Multi-Interface Data Acquisition Gateway Based on 6LoWPAN for Multi-Sensor Situation Author(s): Lun Li, Guangwen Wang, Liang Zhao Presenter: Lun Li, School of Control Science and Engineering, Dalian University of Technology Abstract: The IPv6 over Low Power Wireless Personal Area Network (6LoWPAN) has been used in many areas. How to reduce the number of 6LoWPAN nodes in multi-sensor situation needs to be studied. This paper describes the design and implementation of a multi-interface data acquisition gateway based on 6LoWPAN. The gateway has 6 kinds of data acquisition interfaces, including RS485, CAN, LoRa, ZigBee, 4G and GPRS. Modbus is the protocol of these interfaces' application layer. The gateway is designed with a modular approach, which is easy to be extended or tailored for other applications. Since the acquisition task quantity of the gateway changes with the configuration, and has the characteristics of multi-task synchronization and real-time response, the software design of the gateway is based on the FreeRTOS real-time system to meet the above requirements. In the 6LoWPAN network, the acquisition gateway acts as a 6LoWPAN node. After configuring the gateway through serial port, the gateway first reads sensor data from the interface and then sends the data to the 6LoWPAN module. The test results show that the gateway can read the sensor data correctly according to the configuration requirements. The purpose of using the multi-interface and bus protocol is to reduce the number of 6LoWPAN nodes required in the multi-sensor situation, thus reducing the routing complexity of the 6LoWPAN network, system cost and power consumption.
C1001 **10:45-11:00**	Sorting Batch Decision Nonlinear Blind Equalization Algorithm Based on Clustering and Amplifier Characteristics Author(s): Zhaoyang Xi,Jinshu Chen Presenter: Zhaoyang Xi, Tsinghua University Beijing, China Abstract: In satellite communication, the signal will be affected by the nonlinearity brought by the high-power amplifier (HPA) and the inter-code crosstalk brought by the communication system, resulting in signal distortion. This paper proposes a nonlinear blind equalization algorithm and its application framework based on clustering algorithm and amplifier characteristics in the constellation symbol point domain aims to eliminate these effects. Firstly, clustering center of constellation points. Secondly, correcting the nonlinearity by sorting batch decision. Finally, linear adaptive equalizer eliminates the inter-code crosstalk which mainly uses FIR structure and LMS optimization algorithm. We perform algorithm simulation on the data generated by the actual modulator and demodulator, and the implementation shows that this algorithm can effectively reduce the time complexity of the algorithm, expand the range of symbols phase distortion and be simply applied.
C2001 **11:00-11:15**	Design of a 40W L+S Band Broadband GaN HEMT Power Amplifier Author(s): ChenWei LIANG , ShiChang ZHONG Presenter: ChenWei LIANG, Nanjing Electronic Device Institute Abstract: Based on the 0.5μm GaN HEMT(High Electron Mobility Transistor) process platform of the Nanjing Electronic Device Institute, the design of a broadband power amplifier in the 1.3 to 4 GHz band is introduced. The design of broadband matching circuit is fully based on the advantage of high power density of GaN devices. Based on load pull test data, circuit simulation and actual circuit layout design are carried out. A small size power amplifier with output power greater than 40dBm and drain efficiency greater than 51.6% has been successfully developed in the operating frequency band.

Session 3

C2002 **11:15-11:30**	Adaptive Threshold Adjustment of Clear Channel Assessment in LAA Downlink Author(s): Yu Li, Dongyao Wang, Xiaobao Sun, Wei Ni Presenter: Dongyao Wang, Jiangsu Automation Research Institute, China Abstract: In long term evolution (LTE), the carriers around 5GHz are planned to be utilized without licenses to further enlarge system capacity. This feature is termed as licensed assisted access (LAA). The channel sensing (clean channel assessment, CCA) is required before any transmission on these unlicensed carriers, in order to make sure the harmony co-existence of LAA with other radio access technology in the unlicensed band. Obviously, the CCA threshold is very critical, which decides whether the transmission right following CCA is delivered in time and without collisions. An improper CCA threshold may cause buffer overflow of some eNodeBs, if the eNodeBs are heavily loaded with the traffics. Thus, to solve these problems, we propose an adaptive threshold adjustment method for CCA in the LAA down link. Both the load and transmission opportunities are concerned. The trend of the LAA throughput as the threshold varies is obtained, which guides the threshold adjustment. The co-existing between LAA and Wi-Fi is particularly tested. The results from system level simulation confirm the merits of our design, especially in heavy traffic cases.
C2006 **11:30-11:45**	Utilization of byzantine attack in hard combining-based cooperative spectrum sensing Author(s): Jun Wu, Zehao Chen, Ze Chen, Jianrong Bao Presenter: Jun Wu, Hangzhou Dianzi University, China Abstract: Cooperative spectrum sensing (CSS) using multiple-user diversity provides improved detection for the primary user (PU), which opens the cognitive radio (CR) system to Byzantine attack resulting in a dramatic decrease of the CSS performance. In this paper, we conduct an in-depth investigation on Byzantine attack and take advantage of robust reputation management mechanism (RMM) to utilize Byzantine data. Simulation results show that the utilization of Byzantine attack (UBA) scheme significantly increases the detection probability and decreases the false alarm probability in the voting rule.
C2008 **11:45-12:00**	Sequential single symbol differential voting for cooperative spectrum sensing in the presence of byzantine attack and imperfect reporting channels Author(s): Jun Wu, Pei Li, Zehao Chen, Ze Chen, Jianrong Bao Presenter: Jun Wu, Hangzhou Dianzi University, China Abstract: Cooperative spectrum sensing (CSS) has been considered as an essential paradigm of cognitive radio (CR) to significantly improve spectrum utilization. However, due to the presence of Byzantine attack and the imperfect reporting channel, the sensing results may be falsified and distorted, and then are submitted to the fusion center (FC) to cooperate in CSS, resulting in the drastic degradation of the CSS performance. To mitigate the negative impact of Byzantine attack and the imperfect reporting channel, we propose a sequential single symbol differential voting (S3DV) rule, which exploits the single symbol differential method to solve the problem of the imperfect reporting channel and makes use of the data transmission monitoring process to defend against Byzantine attack. Comparing to the existing voting rules, simulation results show that the proposed S3DV can not only significantly reduces the report sample size, but also provide better performance in the front of Byzantine attack and the imperfect reporting channel.


THANK YOU
for your participation