The Hyper-Intelligence Congress 2021

The 23rd IEEE International Conference on High Performance Computing and Communications (HPCC 2021)
The 19th IEEE International Conference on Smart City (SmartCity 2021)
The 7th IEEE International Conference on Data Science and Systems (DSS 2021)
The 7th IEEE International Conference on Dependability in Sensor, Cloud and Big Data Systems and Applications (DependSys 2021)
The 16th International Conference on Green, Pervasive, and Cloud Computing (GPC 2021)
The 2021 IEEE International Conference on Data, Information, Knowledge and Wisdom (DIKW 2021)

December 20-22, 2021, Haikou, Hainan

http://www.ieee-cybermatics.org/2021/hpcc/
Conference Program and Information Booklet

Organized by

Sponsored by
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Presentation Guidelines

Conference Date
The conference is to be held from Dec 20-22, 2021. The time for conference program is based on CST, China Standard Time.

Language
The presentation language of the IEEE HPCC/SmartCity/DSS/DependSys/GPC/DIKW-2021 and associated workshops is English.

For Session Chairs
Session Chairs are requested to join the physical room or online zoom at least 10 minutes before their sessions.

For Authors
You are strongly encouraged to join the physical room or online zoom during your presentation and Q&A. Please confirm your attendance with the Session Chair at least 10 minutes before the session.

Timing
Please check the program for the exact time of your session and where your paper falls within the session.

It is recommended that all IEEE HPCC/SmartCity/DSS/DependSys/GPC/DIKW-2021 presentations use 10-20 minutes presentation time plus 5 minutes question time. However, the Session Chairs will determine the exact presentation time for each paper, based on the number of presentations in each session. The Session Chairs will ensure that you do not over-run the time allocated.

Proceedings
If you are interested in reading papers during the presentations, here are the proceedings:

https://conferences.computer.org/hpccpub

The username and password will be sent to all fully registered participants separately.

Online Conference Venue
Besides six physical rooms, the following zoom/room links are for online conference presentation. You can enter any zoom/room that you are interested in via the links:

Keynote (Zoom URL): https://zoom.us/j/98749187745?pwd=QisxWEZQRjUxNTdMeTFwMVZBS0g1UT09
ID: 987 4918 7745; Password: 786336
地点: 2021年12月20日主会场在一楼海口宴会厅

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Welcome Message from the Congress Chair

Welcome to the Hyper-Intelligence Congress 2021 which includes the 23rd IEEE International Conference on High Performance Computing and Communications (HPCC-2021); the 19th IEEE International Conference on Smart City (SmartCity-2021); the 7th IEEE International Conference on Data Science and Systems (DSS-2021); the 7th IEEE International Conference on Dependability in Sensor, Cloud and Big Data Systems and Applications (DependSys-2021); the 16th International Conference on Green, Pervasive, and Cloud Computing (GPC-2021); the 2021 IEEE International Conference on Data, Information, Knowledge and Wisdom (DIKW-2021).

Hyper-Intelligence refers to higher, super-intelligent abilities to accomplish complex tasks. For instance, hyper-intelligent humans are individuals gifted with extraordinary intellectual aptitudes and are capable of solving the world’s most challenging problems. Hyper-Intelligence is an inter-disciplinary field that studies hyper-connections, hyper-compositions, and hyper-collaborations of intelligent entities in various forms and functions that can be physical or digital, local or remote. The Hyper-Intelligence Congress 2021 covers a multitude of application domains such as high performance computing and communications, smart city, data science and systems, dependability in sensors, cloud and big data systems and applications, green computing, data wisdom, etc. The Congress will usher in a new age of cyber-physical-social-human interactions, revolutionizing and reshaping the world as we know it.

Here we would like to sincerely thank all organizing committee members, program committee members and reviewers for their hard work and valuable contribution. Without your help, these conferences would not have been possible. We greatly appreciate the sponsorship from IEEE, IEEE Computer Society, IEEE CIS Cyber-Physical-Social Systems Task Force, IEEE Technical Committee on Scalable Computing (TCSC), and IEEE SC Hyper-Intelligence Technical Committee (HI-TC). We are very grateful to the keynote speakers for their authoritative speeches. We thank all authors and conference participants for using this forum to communicate their excellent work.

The conferences were planned to be held in Haikou, December 20-22, 2021. Given the COVID-19 pandemic and associated travel restrictions, as the safety of people is of the highest priority, the conferences were held physically and virtually on December 20-22, 2021 accordingly.

We hope you find the conferences a stimulating and exciting forum.

Laurence T. Yang, Vice President and Dean
FCAE, FEIC, MAE, FIEEE, FIET
Chair, IEEE CS Technical Committee on Scalable Computing
Chair, IEEE SMC Technical Committee on Cybermatics
Chair, IEEE SC Hyper-Intelligence Technical Committee
Hainan University, China
Congress Steering Chair
Congress Keynotes

**Keynote 1: Linfu Sun**, Southwest Jiaotong University, China
IT/OT Fusion and Next Generation Industrial Software

**Keynote 2: Steve Chen**, 3rd Brain Research Institute, USA
Advanced Applications of Brain Science + AI + Grid Edge Supercomputing

**Keynote 3: Yuguang “Michael” Fang**, University of Florida, USA
Beef Up the Edge: Building a Service Network for Sensing, Communications, Computing, Storage and Intelligence at the Edge

**Keynote 4: Wayne Dai**, VeriSilicon, China
AI Everywhere: From Cloud Computing to Edge Computing

**Keynote 5: Deqing Zou**, Huazhong University of Science and Technology, China
Deep Learning-Based Vulnerability Detection for Open-Source Software

**Keynote 6: Schahram Dustdar**, Vienna Technical University, Austria
Edge Intelligence – Engineering the New Fabric of IoT, Edge, and Cloud

**Keynote 7: Gang Xia**, CEC Industrial Internet, China
Practice and Exploration of Industry and Finance Platform Based on the IoT

**Keynote 8: Jinzhou Yang**, China Unicom, China
5G-Lead, Data & Intelligence-Driven, Digital Twins Shape the New Pattern of Smart City
Keynote 1: IT/OT Fusion and Next Generation Industrial Software

Linfu Sun, Southwest Jiaotong University, China

About the Keynote Speaker

Linfu Sun, the chair professor of Southwest Jiaotong University, is a member of the 10th, 11th and 12th CPPCC National Committee respectively. He is a talent of the National High-level Talent Special Support Program and the head of the “Cloud Service Platform Technology Innovation Team” sponsored by the Ministry of Science and Technology of China (MOST). He is the chair of the expert committees “Network Collaborative Manufacturing and Smart Factory” and “Industrial Software” of MOST National Key Research and Development Program. He is also a member of the National Industrial Internet Strategy Advisory Expert Committee.

Summary: Based on the information technology and operational technology convergence for the next generation of digital industrial software, Dr. Sun will discuss current topical issues and key challenges correspondingly. Dr. Sun will also conclude with a summary of future trends and goals in the field of industrial software.
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Keynote 2: Advanced Applications of Brain Science + AI + Grid Edge Supercomputing

Steve Chen, 3rd Brain Research Institute, USA

About the Keynote Speaker

Dr. Steve Chen, Member of US National Academy of Engineering, Member of American Academy of Arts and Sciences, Founder and CEO of the 3rd Brain Research Institute in the United States, is a world-renowned supercomputer expert. He has developed the world’s first parallel vector supercomputer for scientific research and industrial applications. Dr. Chen also developed the world’s first high-density blade supercomputer with 128 blades, and the first Internet-based, application-to-application, high efficiency, dynamic enterprise collaborative software TONBU. He has also developed the world’s first Information Super-grid SCP architecture based on supercomputers global network similar to the power grid. He specializes in cutting-edge research and development, and now is focusing on Research the brain, Protect the brain, Develop the brain, and Extend the brain.

Summary: Based on the 5G+ Industrial Internet + Big data + Brain Science + Intelligent supercomputing technologies, Dr. Chen will present his product/project plans in the emerging and advanced digital applications of Healthcare, Education, Agriculture, Energy, Culture/Entertainment and Finance areas.

Dr. Chen will also present his science and technology-based project plans in the demonstration of achieving Chinese National Goals of Rural Revitalization and Carbon Neuralization.
Dr. Yuguang "Michael" Fang received MS degree from Qufu Normal University, Shandong, China in 1987, PhD degree in Systems and Control Engineering from Case Western Reserve University in 1994 and PhD degree in Electrical and Computing Engineering from Boston University in 1997. He was an assistant professor in the Department of Electrical and Computer Engineering at New Jersey Institute of Technology from 1998 to 2000. He then joined the Department of Electrical and Computer Engineering at University of Florida in 2000 as an assistant professor, then was promoted to an associate professor in 2003 and a full professor in 2005, and has been a distinguished professor since 2019. He holds University of Florida Preeminence Term Professorship (2019-2022), University of Florida Research Foundation (UFRF) Professorship (2006-2009, 2017-2020), and University of Florida Term Professorship (2017-2019, 2019-2021).

Dr. Fang received the US National Science Foundation Career Award in 2001 and the Office of Naval Research Young Investigator Award in 2002, 2018 IEEE Vehicular Technology Outstanding Service Award, 2019 Communications Society AHSN Technical Achievement Award, 2015 IEEE Communications Society CISTC Technical Recognition Award, 2014 IEEE Communications Society WTC Recognition Award, and multiple Best Paper Awards from IEEE Globecom (2015, 2011 and 2002) and IEEE ICNP (2006). He has also received the 2019 ECE Faculty Excellence Award in Research, 2010-2011 UF Doctoral Dissertation Advisor/Mentoring Award, and the 2009 UF College of Engineering Faculty Mentoring Award. He served as the Editor-in-Chief of IEEE Transactions on Vehicular Technology (2013-2017) and IEEE Wireless Communications (2009-2012), and serves/served on several editorial boards of journals including the Proceedings of the IEEE (2018-present), ACM Computing Surveys (2017-present), IEEE Transactions on Mobile Computing (2003-2008, 2011-2016), IEEE Transactions on Communications (2000-2011), and IEEE Transactions on Wireless Communications (2002-2009). He has been actively participating in conference organizations such as serving as the Technical Program Co-Chair for IEEE INFOCOM’2014 and the Technical Program Vice-Chair for IEEE INFOCOM’2005. He is the Director of Magazines of IEEE Communications Society and a Distinguished Speaker of IEEE Vehicular Technology. He is a fellow of the IEEE (2008) and a fellow of the American Association for the Advancement of Science (AAAS) (2015).

Summary: Sensing collects data for information, communications transports data for spot data consumption, computing enables data processing and intelligence extraction for decision making and control, while storage provides flexible buffering for optimal scheduling and content distribution, all together providing services for better quality of life. We observe an emerging paradigm shift: network technology is no longer just for message exchanges, rather becomes a utility as the consequence of the convergence of sensing, communications, computing, storage and intelligence (SCCSI), pushing needed services closer to the customers. In this talk, the speaker will present his view on how to put all pieces together and beef up the edge to intelligentize the life dependable systems.
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Keynote 4: AI Everywhere: From Cloud Computing to Edge Computing

Wayne Dai, VeriSilicon, China

About the Keynote Speaker

Dr. Wayne Dai founded VeriSilicon in August 2001 and has been the chairman, president and chief executive officer of the company. Dr. Dai received a bachelor’s degree in computer science and a doctorate in electronic engineering from the University of California, Berkeley, and was a professor in the Department of Computer Engineering at the University of California, Santa Cruz.

Dr. Dai is the founding chairman of the World Association of Electronic Engineers International Conference on Multi-chip Modules, the founding chairman of the World Association of Electronic Engineers Seminar on Integrated Design of Chip Packaging, and the co-chair of the Program Committee of the 2010 International Green Energy Forum. He has served as the associate editor of the World Association of Electronics Engineers Circuit and System Papers Monthly and VLSI System Papers Monthly, and has published more than 100 papers in various technical journals and conferences. In 1990, he was awarded the US Presidential Youth Research Award. Dr. Dai was awarded the title of “Top 10 Entrepreneurs in China” in 2005 and was elected as “Top Ten Talents in Science and Technology in China in 2005”. Best Manager Award, Hurun Report 2014 China Industry Contribution Award, 2018 Global Electronic Achievement Award for Asia-Pacific Innovative Person of the Year, ”Shanghai Smart City Construction Leader” honorary title, 2019 Global Electronic Achievement Award for Outstanding Contributor of the Year prize. Currently, Dr. Dai serves as the vice chairman of the Global Innovation Center, the executive vice chairman of the International Alliance of Innovation and Technology, the vice chairman of the Integrated Circuit Design Branch of the China Semiconductor Industry Association, the chairman of the China RISC-V Industry Alliance, and a member of the Expert Committee of the Automotive Electronics Industry Alliance, Shanghai Deputy Director of the Expert Committee of the Municipal Integrated Circuit Industry Cluster Development Promotion Agency.

Summary: Approximately 80% of data are generated at the edge in 2030 compared to 20% in 2015. It is estimated that less than 2% of the data generated from IoT devices are used in 2020 and less than 0.5% will be used in 2030. AI computing is evolving from centralized cloud Server to Edge Servers to Edge Devices as distributed computing. Today, most machine learning algorithms are designed to be calculated in a single processor/device, so people are not taking advantage of all computational power in their house. There are many Open Source machine learning Algorithms available online, however, accurate, trained ML models are not public, datasets are not public and can contain sensitive customer data. Our vision is to build an Open, Creative, Secured AI Ecosystem. While cloud computing requires high performance, edge computing needs low power consumption. Compared with CPU, FPGA, and GPU, ASIC has great advantages in terms of computing efficiency, size, and cost. VeriSilicon provides platform-based, all-round, one-stop custom silicon services and semiconductor IP licensing.
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Keynote 5: Deep Learning-Based Vulnerability Detection for Open-Source Software

Deqing Zou, Huazhong University of Science and Technology, China

About the Keynote Speaker

Deqing Zou is a Professor and an Executive Dean in the School of Cyber Science and Engineering at Huazhong University of Science and Technology, Wuhan, China. His research interest lies in system security, trusted computing, virtualization and cloud security. He has received an Excellent Teacher of National Cyber Security and a Winner of Education Ministry's New Century Excellent Talents Program. He has co-authored four books and published over 100 refereed journal and conference papers in his research areas, including IEEE TDSC, IEEE TPDS, ACM TOSEM, NDSS, ASE, ASPLOS, etc. He has served as a reviewer for many prestigious journals such as IEEE TDSC, IEEE TOC, IEEE TPDS, and IEEE TCC. He has also served as PC chair/PC member of more than 40 international conferences.

Summary: The detection of software vulnerabilities is a significant problem that has yet to be tackled, as manifested by the many vulnerabilities reported on a daily basis. The wide reuse of open-source software and the increasing complexity of software supply-chains make the problem of detecting software vulnerabilities even more imperative. This talk will discuss our recent research on deep learning-based vulnerability detection for open-source software, beginning with the first deep learning-based vulnerability detector for library/API-related vulnerabilities. Then this talk will present a multiclass deep learning-based vulnerability detector, a framework for deep learning-based vulnerability detection, and a fine-grained vulnerability detector for locating vulnerable statements. Finally, this talk will also discuss a practical method toward tackling the interpretability of the deep learning model in vulnerability detection.
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Keynote 6: Edge Intelligence – Engineering the New Fabric of IoT, Edge, and Cloud

Schahram Dustdar, Vienna Technical University, Austria

About the Keynote Speaker

Schahram Dustdar is a Full Professor of Computer Science, he is also the director of distributed Systems Research at the Vienna Technical University, heading the Research Division of Distributed Systems at the TU Wien, Austria. He has an H-index of 78 with some 36,000 citations. He holds several honorary positions: University of California (USC) Los Angeles; Monash University in Melbourne, Shanghai University, Macquarie University in Sydney, University Pompeu Fabra, Barcelona, Spain. From Dec 2016 until Jan 2017 he was a Visiting Professor at the University of Sevilla, Spain and from January until June 2017 he was a Visiting Professor at UC Berkeley, USA. From 1999 – 2007 he worked as the co-founder and chief scientist of Caramba Labs Software AG in Vienna (acquired by Engineering NetWorld AG), a venture capital co-funded software company focused on software for collaborative processes in teams. Caramba Labs was nominated for several (international and national) awards: World Technology Award in the category of Software (2001); Top-Startup companies in Austria (CapGemini Ernst & Young) (2002); MERCUR Innovation award of the Austrian Chamber of Commerce (2002). He is founding co-Editor-in-Chief of ACM Transactions on Internet of Things (ACM TIoT) as well as Editor-in-Chief of Computing (Springer). He is an Associate Editor of IEEE Transactions on Services Computing, IEEE Transactions on Cloud Computing, ACM Computing Surveys, ACM Transactions on the Web, and ACM Transactions on Internet Technology, as well as on the editorial board of IEEE Internet Computing and IEEE Computer. Dustdar is recipient of multiple awards: IEEE TCSVC Outstanding Leadership Award (2018), IEEE TCSC Award for Excellence in Scalable Computing (2019), ACM Distinguished Scientist (2009), ACM Distinguished Speaker (2021), IBM Faculty Award (2012). He is an elected member of the Academia Europaea: The Academy of Europe, where he is chairman of the Informatics Section, as well as an IEEE Fellow (2016) and an Asia-Pacific Artificial Intelligence Association (AAIA) Fellow (2021).

Summary: As humans, things, software and AI continue to become the entangled fabric of distributed systems, systems engineers and researchers are facing novel challenges. In this talk, we analyze the role of IoT, Edge, Cloud, and Human-based Computing as well as AI in the co-evolution of distributed systems for the new decade. We identify challenges and discuss a roadmap that these new distributed systems have to address. We take a closer look at how a cyber-physical fabric will be complemented by AI operationalization to enable seamless end-to-end distributed systems.
Keynote 7: Practice and Exploration of Industry and Finance Platform Based on the IoT

Gang Xia, CEC Industrial Internet, China

About the Keynote Speaker

Dr. Gang Xia, born in Hangzhou, Zhejiang Province in 1975, graduated from the National University of Defense Technology with a PhD in Aircraft Design. He used to be a professor at the National University of Defense Technology, a visiting scholar at the School of Mechanical Engineering of the Technical University of Munich, Germany, now a researcher-level senior engineer of China Electronics Corporation, a member of the CEC group science and technology committee.

In 2018, Dr. Xia joined CEC Industrial Internet in Changsha, Hunan Province, a secondary enterprise of China Electronics Group, as the deputy general manager. In 2019, he concurrently served as Chairman of CEC FreundSchaft Technology Co., Ltd. in Fujian Province.

Dr. Gang Xia has made important contributions to the company’s initial development after entering CEC Industrial Internet. Especially since he became the chairman of CEC FreundSchaft in 2019, he has actively promoted the implementation of intelligent manufacturing and industrial Internet in Fujian Province. The company’s technological level has been continuously improved, and the intelligent manufacturing solutions have been improved in more than 100 factories. In 2019, the large-scale personalized customized solution for the footwear industry was awarded the Industrial Internet Innovative Application Solution of the Ministry of Industry and Information Technology. Out of the 1457 projects in the 2nd China Industrial Internet Competition organized by the Ministry of Industry and Information Technology in 2020, Dr. Xia won the second place in the newcomer group. In 2020, he was awarded the Science and Technology Talent Award (civilian category) of CEC Group. In April 2021, Gang Xia was rated as a provincial-level talent in Fujian Province’s tens of millions of projects.

Summary: Nowadays, the Internet of Things (IoT) is a hot spot in the field of intelligent manufacturing. Many companies are joining the wave of entrepreneurship in IoT products, however, there are very few companies that are truly profitable, especially those that can obtain value-added services from the IoT industry for a long time. CEC Industrial Internet Platform, which names Bach OS, is an industrial Internet platform established by CEC group based on the PKS autonomous and controllable software and hardware system. Bach OS has developed a large number of industrial Internet services in different regions and industries. Among them, the CEC Fujian Industrial Cloud Platform is a regional industry cloud platform operated by CEC FreundSchaft Technology Co., Ltd., a three-tier subsidiary of CEC Group, serving the footwear and textile industries.

A series of explorations have been carried out on the industry and finance platform based on the IoT. The platform focuses on three core capabilities of smart hardware, smart risk control, and IoT finance. It supervises the main production factors of manufacturing enterprises through the IoT in real time. Through cooperation with Baidu Smart Cloud, it integrates IoT finance and risk control evaluation capabilities. Connect to the CEC Fujian Industrial Internet platform to build big data for industry and finance, and realize cloud-based intelligent risk control and credit evaluation capabilities. By strengthening the physical perception, precise positioning, real-time monitoring, dynamic measurement, and automatic early warning of production equipment and materials, the intelligent perception of production factor financing, full-process tracking management, standardized supervision and operation are realized, and the reform of financial risk control is accelerated to make offline Online finance, innovating an ecological model of real-time controllable integration of finance and entities.
Keynote 8: 5G-Lead, Data & Intelligence-Driven, Digital Twins Shape the New Pattern of Smart City

Jinzhou Yang, China Unicom, China

About the Keynote Speaker

Jinzhou Yang graduated from Beijing University of Posts and Telecommunications with a master’s degree. He is the chief consultant of China Unicom’s digital economy and the director of the Smart City Research Office in China Unicom Research Institute. His main research directions are industrial Internet business, smart city top-level design, blockchain and digital economy planning, with nearly 20 provincial and municipal smart city and digital government-related top-level designs and more than 70 industry solutions experience. Jinzhou Yang is also an ITU standard expert, member of national smart city standardization overall group and “Internet +” alliance. He has successively obtained the certification of cloud computing and big data senior architect and planner issued by the Talent Exchange Center of the Ministry of Industry and Information Technology. Besides, he patented more than 30 inventions and published many papers on smart city, blockchain and big data.

Summary: At present, 5G, big data and artificial intelligence have become the leading and driving force in the construction of smart cities. With the gradual maturity of digital twin technology and the continuous improvement of urban digital infrastructure, especially with the rise of “Metaverse”, smart cities are facing new development opportunities. In the future, the deep integration of digital technology will significantly improve the efficiency of urban governance, complement the shortcomings of the city, strengthen the global intelligence, and truly realize the intelligent and sustainable development of the city.
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IEEE HPCC/SmartCity/DSS/DependSys/GPC/DIKW-2021

Physical Presentation Program
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<th>Speaker/Institution</th>
<th>Chair(s)</th>
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<tr>
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<td>Opening Ceremony</td>
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<tr>
<td>10:00-10:20</td>
<td>Coffee Break</td>
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| 10:20-11:00  | Keynote 1: IT/OT Fusion and Next Generation Industrial Software  
Linfu Sun, Southwest Jiaotong University, China  
Chaired by Bing Guo, Sichuan University, China |                                                          |                                            |
| 11:00-11:40  | Keynote 2: Advanced Applications of Brain Science + AI + Grid Edge Supercomputing  
Steve Chen, 3rd Brain Research Institute, USA  
Chaired by Rong Gu, Nanjing University, China |                                                          |                                            |
| 11:40-12:20  | Keynote 3: Beef Up the Edge: Building a Service Network for Sensing, Communications, Computing, Storage and Intelligence at the Edge  
Yuguang “Michael” Fang, University of Florida, USA  
Chaired by Xiaokang Wang, St. Francis Xavier University, Canada |                                                          |                                            |
| 12:20-14:30  | Lunch Break                                  |                                                          |                                            |
| 14:30-15:10  | Keynote 4: AI Everywhere: From Cloud Computing to Edge Computing  
Wayne Dai, VeriSilicon, China  
Chaired by Huazhong Liu, Hainan University, China |                                                          |                                            |
Deqing Zou, Huazhong University of Science and Technology, China  
Chaired by Xianjun Deng, Huazhong University of Science and Technology, China |                                                          |                                            |
| 15:50-16:30  | Keynote 6: Edge Intelligence – Engineering the New Fabric of IoT, Edge, and Cloud  
Schahram Dustdar, Vienna Technical University, Austria  
Chaired by Qingchen Zhang, Hainan University, China |                                                          |                                            |
| 16:30-16:50  | Coffee Break                                 |                                                          |                                            |
| 16:50-17:30  | Keynote 7: Practice and Exploration of Industry and Finance Platform Based on the IoT  
Gang Xia, CEC Industrial Internet, China  
Chaired by Hua Li, Hainan University, China |                                                          |                                            |
| 17:30-18:10  | Keynote 8: 5G-Lead, Data & Intelligence-Driven, Digital Twins Shape the New Pattern of Smart City  
Jinzhou Yang, China Unicom, China  
Chaired by Bang Wang, Huazhong University of Science and Technology, China |                                                          |                                            |
<p>| 18:10-19:30  | Reception                                   |                                                          |                                            |</p>
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<td>9:40-10:05</td>
<td>Coffee Break</td>
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<td>SmartCity-1: Smart City Systems (I)</td>
<td>SmartCity-2: Smart City Systems (II)</td>
<td>SmartCity-3: Enabling Technologies for Smart City (I)</td>
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<td>10:05-11:45</td>
<td>HPCC-5: Parallel and Distributed Computing and Systems (II)</td>
<td>HPCC-6: Communications and Networking (I)</td>
<td>HPCC-7: Communications and Networking (II)</td>
<td>SmartCity-1: Smart City Systems (I)</td>
<td>SmartCity-2: Smart City Systems (II)</td>
<td>SmartCity-3: Enabling Technologies for Smart City (I)</td>
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<td>11:45-13:30</td>
<td>Lunch Break</td>
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<td>SmartCity-4: Big Data and Data Mining For City (I)</td>
<td>SmartCity-5: Big Data and Data Mining For City (II)</td>
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<td>13:30-15:10</td>
<td>HPCC-8: Communications and Networking (III)</td>
<td>HPCC-9: Communications and Networking (IV)</td>
<td>HPCC-10: Communications and Networking (V)</td>
<td>GPC-1: Intelligent Sensing and Computing</td>
<td>SmartCity-4: Big Data and Data Mining For City (I)</td>
<td>SmartCity-5: Big Data and Data Mining For City (II)</td>
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<td>15:10-15:30</td>
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<td>SmartCity-6: Big Data and Data Mining For City (III)</td>
<td>SmartCity-7: Big Data and Data Mining For City (IV)</td>
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<td>15:30-17:10</td>
<td>HPCC-11: Communications and Networking (VI)</td>
<td>HPCC-12: Communications and Networking (VII)</td>
<td>HPCC-13: Communications and Networking (VIII)</td>
<td>GPC-3: Pervasive and Green Applications (II)</td>
<td>SmartCity-6: Big Data and Data Mining For City (III)</td>
<td>SmartCity-7: Big Data and Data Mining For City (IV)</td>
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<td>18:10-19:30</td>
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<td>8:00-9:40</td>
<td>HPCC-14: High Performance Computing and Applications (IV)</td>
<td>HPCC-15: High Performance Computing and Applications (V)</td>
<td>HPCC-16: Parallel and Distributed Computing and Systems (III)</td>
<td>SmartCity-8: Big Data and Data Mining For City (V)</td>
<td>SmartCity-9: Smart City Services (I)</td>
<td>DIKW-4: Data-Information-Knowledge-Wisdom</td>
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Wednesday December 22, 2021 (China Standard Time CST, UTC+8)
The HPCC 2021 Physical Presentation Program

HPCC-1: High Performance Computing and Applications (I)
Session Chair: Jing Yang, Huazhong University of Science and Technology, China

1. A Transpose-Free Three-Dimensional FFT Algorithm on ARM CPUs
Tun Chen; Haipeng Jia; Zhihao Li; Chendi Li; Yunquan Zhang

2. Visual Sensitivity Aware Rate Adaptation for Video Streaming via Deep Reinforcement Learning
Jin Ye; Meng Dan

3. Three-Level Compact Caching for Search Engines Based on Solid State Drives
Rui Zhang; Pengyu Sun; Jiancong Tong; Ruirui Zang; Heng Qian; Yu Pan; Rebecca J. Stones; Gang Wang; Xiaoguang Liu; Yusen Li

Zhanjun Hao; GaoYuan Liu; Xiaochao Dang; Daiyang Zhang; Yanhong Bai; Hongwen Xu

5. Universal Adversarial Attack Against 3D Object Tracking
Riran Cheng; Nan Sang; Yinyuan Zhou; Xupeng Wang

HPCC-2: High Performance Computing and Applications (II)
Session Chair: Ning Zhang, Huazhong University of Science and Technology, China

1. Efficient Hardware Redo Logging for Secure Persistent Memory
Zhan Zhang; Jianhui Yue; Xiaofei Liao; Hai Jin

2. A Cost-Efficient Metadata Scheme for High-Performance Deduplication Systems
Yuxuan Mo; Yu Hua; Pengfei Li; Qin Cao; Xue Liu

3. High Speed True Random Number Generator Controlled by Logistic Map
Yuling Luo; Shuming Han; Shunsheng Zhang; Yanhu Wang; Junxiu Liu

4. DRStencil: Exploiting Data Reuse Within Low-Order Stencil on GPU
Xin You; Hailong Yang; Zhonghui Jiang; Zhongzhi Luan; Depei Qian

5. Attention-Based F-UNet for Remote Sensing Image Fusion
Pingfan Zhang; Qian Jiang; Li Cai; Ruxin Wang; Puming Wang; Xin Jin

HPCC-3: High Performance Computing and Applications (III)
Session Chair: Yaliang Zhao, Henan university, China

1. AP^3: Adaptive Power Prediction Framework Based on Spatial Partition Multi-Phase Model
Juan Chen; Zhixin Ou; Yifei Guo; Xinxin Qi; Yuyang Sun; Lin Deng; Hongyu Chen; Zihan Lin

2. Personalized QoE Optimization With Edge-Aided Video Enhancement Services
Hanlong Liao; Guoming Tang; Teng Liang; Longguang Wang; Deke Guo

3. Frend for Edge Servers: Reduce Server Number! Keeping Service Quality!
Pengmiao Li; Yuchao Zhang; Wendong Wang; Kaichuan Zhao; Bo Lian; Ke Xu; Zhili Zhang

4. Advanced Architecture Design of High-Radix Router Based on Chiplet Integration and IP Reusability
Chongshan Liang; Dai Yi; Weixia Xu; Qiong Li

5. Embrace the Conflicts: Exploring the Integration of Single Port Memory in Systolic Array-Based Accelerators
Renyu Yang; Junzhong Shen; Mei Wen; Yasong Cao; Yuhang Li

HPCC-4: Parallel and Distributed Computing and Systems (I)
Session Chair: Yixuan Geng, Huazhong University of Science and Technology, China
1. HotFed: Hot Start Through Self-Supervised Learning in Federated Learning
Juan Zhao; Ruixuan Li; Haozhao Wang; Zijun Xu

2. Semi-Supervised Federated Learning With Non-IID Data: Algorithm and System Design
Zhe Zhang; Shiyou Ma; Jiangtian Nie; Yi Wu; Qiang Yan; Xiaoke Xu; Dusit Niyato

3. On-Demand Intelligent Routing Algorithms for the Deterministic Networks
Zhongli Wu; Wenrui Huang; Zhewei Dai; YuanYuan Cao; Bin Dai; Yijun Mo

4. Distributed Service Placement in Ultra-Dense Edge Computing: A Game-Theoretical Approach
Junyi He; Di Zhang; Xishuo Li; Yuezi Zhou; Yaonan Zhang

5. ER-KV: High Performance Hybrid Fault-Tolerant Key-Value Store
Yingjie Geng; Jinfeng Luo; Gang Wang; Xiaoguang Liu

1. Bilinear Graph Neural Network-Enhanced Web Services Classification
Lulu Zhang; Buqing Cao; Mi Peng; Yueying Qing; Guosheng Kang; Jianxun Liu; Kenneth K. Fletcher

2. An Energy-Efficient Task Scheduling Strategy Based on Improved Fireworks Algorithm in Heterogeneous Cloud
Hui Zhao; Fanxin Meng; Nanzhi Feng; Quan Wang; Bo Wan; Jing Wang

3. AMSC: Adaptive Multi-Channel Graph Convolutional Network-Enhanced Web Services Classification
Yueying Qing; Buqing Cao; Mi Peng; Lulu Zhang; Guosheng Kang; Jianxun Liu; Kenneth K. Fletcher

4. PSear: Performance Prediction for Partially Co-located Distributed Deep Learning
Weijia Ding; Ziwei Ding; Leiping Zhao; Tie Qiu

5. The Parallelized Cuckoo Filter for Cold Data Representation
Bowen Sun; Lailong Luo; Shangsen Li; Yingwen Chen; Deke Guo

1. Adaptive GRU With Regularization Item for Book Sales Prediction
Hongyue Xie; Lingwu Liu

2. DDoS Defense Scheme Based on Machine Learning in Software-Defined Networking
Hong Zhong; Chao Yu; Jie Cui; Xiwen Sun; Chengjie Gu; Lu Liu

3. HER2-MCNN: A HER2 Classification Method Based on Multi Convolution Neural Network
Xingang Wang; Cuiling Shao; Jianlong Lv; Hu Liang; Na Li

4. PEAN: A Packet-Level End-To-End Attentive Network for Encrypted Traffic Identification
Peng Lin; Yishen Hu; Yanying Lin; Kejiang Ye; Chengzhong Xu

5. Global Cyclic Queuing and Forwarding Mechanism for Large-Scale Deterministic Networks
Yijun Mo; Zihan Yang; HuiYu Huiyu Liu; Tianliu He

1. DyDom: Detecting Malicious Domains With Spatial-Temporal Analysis on Dynamic Graphs
Yixin Li; Xi Luo; Liming Wang; Zhen Xu

2. GMAF: A Novel Gradient-Based Model With Arcface for Network Traffic Classification
Yaohua Xia; Gang Xiong; Zhen Li; Gaopeng Gou; Chang Liu
3. A Sequential Recommendation of Hawkes Process Fused With Attention Mechanism  
Xilin Wen; Jianfang Wang; Xu Yang; Qiuling Zhang

Panpan Zhao; Zhen Li; Mingxin Cui; Jie Lu; Gang Xiong; Gaopeng Gou

5. Large-Scale Measurement of Encrypted TLS Server Name Indication (ESNI): How Far Have We Come?  
Yangyang Guan; Wei Xia; Gaopeng Gou; Peipei Fu; Bingxu Wang; Zhen Li

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**HPCC-8: Communications and Networking (III)**  
**Session Chair: Yixuan Geng, Huazhong University of Science and Technology, China**

1. RF Transmitter Identification and Classification Based on Deep Residual Shrinkage Network  
Xiuhua Wen; Chunjie Cao; Yang Sun; Yifan Li; Haifeng Peng

Changhong Wang; Dezun Dong; Zicong Wang; Xiaoyun Zhang; Zhenyu Zhao

3. Interference-Aware Trajectory Design for Fair Data Collection in UAV-Assisted IoT Networks by Deep Reinforcement Learning  
Gong Chen; Xiangping Bryce Zhai; Congduan Li

4. Efficiently Managing Large-Scale Keys in HDFS  
Wei Jin; Kui Geng; Mingjie Yu; Yunchuan Guo; Fenghua Li

5. Optimal Deployment Design of Repeaters and Memories in Quantum Networks  
Jiangyuan Yao; Kaiwen Zou; Deshun Li; Zheng Jiang

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**HPCC-9: Communications and Networking (IV)**  
**Session Chair: Minghua Wang, University of South China, China**

1. RSM-PA: Research on Route Selection Method of Inter-Domain Routing System Based on Path Availability  
Huihu Zhu; Han Qiu; Junhu Zhu; Qingxian Wang

2. BEDIM: Lateral Movement Detection in Enterprise Network Through Behavior Deviation Measurement  
Cong Dong; Yufan Chen; Yunjian Zhang; Yunjian Zhang; Zhigang Lu; Pu Dong; Baoxu Liu

3. Jumping on the Bandwagon: Group Opinion Prompts Agents to Reach Consensus  
Si Cheng; Can Sun; Song Yang; Minghua Xu; Han Xu

4. Punchcard: A Practical Red-Zone Based Scheme for Low-Overhead Heap Protection  
Chaochao Zhang; Amro Awad; Rui Hou; Rui Hou

5. A Contextual and Content Features-Based Device Behavioral Fingerprinting Method in Smart Grid  
Zhongfeng Jin; Nan Li; Chao Liu; Meimei Li; Shaohua An; Weiqing Huang

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**HPCC-10: Communications and Networking (V)**  
**Session Chair: Jing Yang, Huazhong University of Science and Technology, China**

1. Accelerating Robot Reinforcement Learning With Samples of Different Simulation Precision  
Yong Zhao; Yuanzhao Zhai; Jie Luo; Dawei Feng; Bo Ding; Zhen Li

2. Network Latency Estimation: A Tensor-Based Weighted Singular Value Thresholding Method  
Weice Sun; Jun Tao; Yifan Xu; Yang Gao; Zuyan Wang

3. HSS: Faster and More Accurate Sliding Sketch by Using Half Fields  
Zijun Hang; Yongjie Wang; Yongjie Wang; Shuguang Huang

4. HASP: High Availability SFC Placement Approach in Data Center Network  
Ziqi Xu; Qingmian Han; Bo Cheng; Meng Niu; Junliang Chen
5. Distributed Pseudonym Mechanism Based on Consortium Blockchain  
   BaoHui Li; MiaoMiao Wang; Shiyou Chen; Lanlan Rui; Yang Yang; Zhipeng Gao

**HPCC-11: Communications and Networking (VI)**  
Session Chair: Yixuan Geng, Huazhong University of Science and Technology, China

1. A Dynamic Algorithm for Submodular Maximization With a Knapsack Constraint  
   Tianshuai Zhu; Kai Han; Enpei Zhang; BenWei Wu

2. BOBBLE: A Mixed Routing-Granularity Distributed Load Balancing for Data Center Networks  
   Zhengzhi Xu; Yifei Lu; Xu Ma

3. MEMG: Mobile Encrypted Traffic Classification With Markov Chains and Graph Neural Network  
   Wei Cai; Gaopeng Gou; Minghao Jiang; Chang Liu; Gang Xiong; Zhen Li

4. Feature Engineering Framework Based on Secure Multi-Party Computation in Federated Learning  
   Litong Sun; Runmeng Du; Daojing He; Shanshan Zhu; Rui Wang; Sammy Chan

5. Learning-Based Task Offloading in Dynamic Orbital Edge Computing Network  
   Jiang Fang; Haitao Liu; Jiyan Sun; Ting Li; Yinlong Liu; Zhaorui Guo; Shangyuan Zhuang; Liru Geng

**HPCC-12: Communications and Networking (VII)**  
Session Chair: Debin Liu, Huazhong University of Science and Technology, China

1. Detecting Data Leakage in DNS Traffic Based on Time Series Anomaly Detection  
   Futai Zou; Yundong Ren; Jiachen Zhu; Junhua Tang

2. An SEI-Based Identification Scheme for Illegal FM Broadcast  
   Shaoying Guo; Yanyun Xu; Weiqing Huang; Bo Liu

3. Browser Fingerprinting Identification Using Incremental Clustering Algorithm Based on Autoencoder  
   Futai Zou; Haochen Zhai

4. A Two-Stage Deanonymization Attack Towards Bitcoin Hidden Service Nodes  
   Yue Gao; Jinqiao Shi; Xuebin Wang; Ruisheng Shi; Can Zhao; Chenglong Li

**HPCC-13: Communications and Networking (VIII)**  
Session Chair: Jing Yang, Huazhong University of Science and Technology, China

1. Secure Skyline Groups Queries on Encrypted Data on Cloud Platform  
   Yiping Teng; Yue Sun; Zhan Shi; Dongyue Jiang; Liang Zhao; Chunlong Fan

2. A Privacy-Aware Cross-Domain Device Authentication Scheme for IIoT Based on Blockchain  
   Boyuan Gao; Hairong Yan; Rui Tian

3. Semantic-Based Heterogeneous Controller Collaboration for Space-Terrestrial Integrated Networks  
   Yaru Bao; Feilong Tang; Xu Li; Long Chen; Jiacheng Liu; Yanqin Yang; Wenchao Xu; Lijun Cao; Ping Han

4. TeeSwap: Private Data Exchange Using Smart Contract and Trusted Execution Environment  
   Peng Chen; Peichang Shi; Jie Xu; Xiang Fu; Linhui Li; Tao Zhong; Liangliang Xiang; Liangliang Xiang

5. A Novel Path Planning-Aware Vehicular Task Offloading Strategy  
   Yufei Liu; Liang Zhao; Kaisi Yang; Yunpeng Li

**HPCC-14: High Performance Computing and Applications (IV) (Short Paper)**  
Session Chair: Minghua Wang, University of South China, China

1. CMLB: A Communication-Aware and Memory Load Balance Mapping Optimization for Modern NUMA Systems  
   Jingbo Li; Yuxin Zhang; Xingjun Zhang
2. Optimized Monocular Depth Estimation with Reparameterization on Embedded Devices
Siping Liu; Renfa Li; Xiaohan Tu; Guoqi Xie; Cheng Xu

3. A Noc Centric Low Overhead Multi-Chip Interconnection Technology
Xing Hu; Yang Zhang; Li Mao; Jie Shen; Zuocheng Xing

4. Efficient Memory Access-Aware BWA-SMEM Seeding Accelerator for Genome Sequencing
Zhang Ying; Li Luo; Jian Zhang; Quanyou Feng; Lei Wang

5. Zone Based Writing Optimization in User Space
Runnan Shen; Yuting Liu; Rui Zhang; Jinbin Zhu; Zhonglin Liu; Limin Xiao

6. Winograd-CNN Accelerator Compatible With Sparse and Non-Sparse Models
Huazheng Li; Weiiting Chen; Jiangtao Wang

**HPCC-15: High Performance Computing and Applications (V) (Short Paper)**
Session Chair: Xin Nie, Huazhong University of Science and Technology, China

1. A High-Precision DQDS Algorithm
Chuanying Li; Xiong Xiao; Peibing Du; Hao Jiang; Roberto Barrio; Zhe Quan; Kenli Li

2. Task Offloading and Parameter Optimization of MAR in Multi-Access Edge Computing
Yumei Li; Xiumin Zhu; Shudian Song; Shuyue Ma; Feng Yang; Linbo Zhai

3. A Word-Length Optimized Parallel Framework for Accelerating Option Pricing Model
Yuan Li; Lei Zhang; Yi Dai; Yi Dai

4. Reinforcement Learning Based Data Compression for Energy-Efficient Non-Volatile Caches
Fanfan Shen; Chao Xu; Jun Zhang; Yong Chen; Yanxiang He

5. Characterizing OpenMP Synchronization Implementations on ARMv8 Multi-Cores
Pengyu Wang; Wanrong Gao; Jianbin Fang; Chun Huang; Zheng Wang

**HPCC-16: Parallel and Distributed Computing and Systems (III) (Short Paper)**
Session Chair: Yaliang Zhao, Henan university, China

1. Containerized Workflow Builder for Kubernetes
Chenggang Shan; Guan Wang; Yuanqing Xia; Yufeng Zhan; Jinhui Zhang

2. FNCS: Federated Learning Strategy Based on Cosine Similarity Under Resource Constraints
Ruonan Li; Yang Qin; Lu Zhang

3. Research on Cross-Camera Person Re-Identification Using Overlapping Field of View
Zhibin Zhao; Yinuo Yao; Huicheng Chen; Jun Wang; Yongming Yan

4. A Multiobjective Memetic Algorithm for Workflow Scheduling on Heterogeneous Computing Systems
Chengming Zou; Peng Cheng; Mengyuan Shi; Xing Liu

5. A Branch-And-Bound Algorithm for Computing the Reliable Isolated Zeros of Multivariate Polynomial Functions
Cheng Chen; Liangyu Chen; Zhenbing Zeng; Dang Lin

6. A Mapping-Based Dynamic Semi-Online Task Scheduling Method for Minimizing Energy in Edge Computing
Hui Zhao; Nanzhi Feng; Fanxin Meng; Quan Wang; Bo Wan; Jing Wang

**HPCC-17: Communications and Networking (IX) (Short Paper)**
Session Chair: Debin Liu, Huazhong University of Science and Technology, China

1. A Message-Based Malicious Detection Scheme of Public DNS Services
Chaoqun Li; Liang Dai; Zhen Xu; Ying Ding; Yanni Han
2. StatekeepSpec: Securing Speculative Execution via Forbidding Change-Of-State
Zhiyuan Lv; Youjian Zhao

3. A Dual Adaptive Factorization Network for CTR Prediction
Xianzhuang Li; Zhen Wang; Xuesong Wu; Bo Yuan; Xueqian Wang

4. An End-To-End IP Header Compressed Packet Forwarding Framework for Bandwidth Constrained Networks
Wen-Kang Jia; LiTian Chen; Jianhui Xiong; Zhexin Xu

5. Research on Competition and Cooperation in the Process of Multi-Source Information Dissemination in Social Network
Jing Chen; Jincheng Huang; Yaxuan Sun

HPCC-18: Communications and Networking (X) (Short Paper)
Session Chair: Jiuzhen Zeng, Huazhong University of Science and Technology, China
1. T-Path Based Reliable and Real-Time Routing in Battery-Free Wireless Sensor Network
Kunyi Chen; Hong Gao; Siyao Cheng; Quan Chen; Jianzhong Li

2. A Novel Joint Prediction Model of Atmospheric Attenuation for Co-Frequency Interference Analysis between LEO Constellations
Degang Sun; Jingru Geng; Wen Wang; Yiqing Liu

3. A Coverage-Guided Fuzzing Framework for Trusted Execution Environments
Chenlin Huang; Yusong Tan; Guoyun Duan; Zhiwen Chen; Boyang Zhang; Peiyao Deng; Qianxiang Zhang; Jianhua Sun; Hao Chen; Guoqing Xiao; Qing Liao

4. A Novel Feature Method for Fast Extraction of Mining Traffic
Peifa Sun; Lizhi Peng; Bo Yang; Shuaili Liu

5. A Highly Efficient Profiled Power Analysis Attack Based on Power Leakage Fitting
Yuanzhi Li; Shanshan Xu; Yuling Luo; Sheng Qin; Shunsheng Zhang; Min Su

6. A Residual Fingerprint-Based Defense Against Adversarial Deepfakes
Jianguo Jiang; Boquan Li; Shuai Yu; Chao Liu; Shaohua An; Mingqi Liu; Min Yu

HPCC-19: Artificial Intelligence Empowered Efficient and Secure 6G Networking and Communications
(I) (Special Session 1)
Session Chair: Yaliang Zhao, Henan University, China
1. Distributed Trust Evaluation Mechanism of LEO Satellites for 6G Network
Hui Li; DongChong Shi; Ruijin Zhou; Dan Liao; Ming Zhang; Yuliang Zhou

Anna Li; Eliane Bodanese; Fei Luo; Tianwei Hou; Kaishun Wu

3. Fast Synchronization of Model Updates for Collaborative Learning in Micro-Clouds
Long Luo; Yuchen Zhang; Qixuan Jin; Hongfang Yu; Gang Sun; Shouxi Luo

4. Resource-Efficient DNN Training and Inference for Heterogeneous Edge Intelligence in 6G
Enfang Cui; Weiting Zhang; Dong Yang; Wen Wu; Feng Lyu

5. FIT: Fairness-Aware Intelligent Traffic Signal Control With Deep Reinforcement Learning
Jian Chen; Zhengwei Zhang; Jianhang Feng; Kun Zhu

6. Attributes Based Bayesian Unknown Hazards Assessment for Digital Twin Empowered Autonomous Driving
Zhonglin Hou; Hong Liu; Yan Zhang

HPCC-20: Artificial Intelligence Empowered Efficient and Secure 6G Networking and Communications
1. Edge Intelligence-Based UAV Human Target Recognition With Improved YOLOV5 Algorithm
   Zeyu Cai; Yuben Qu; Chao Dong

2. Knowledge-Assisted DRL for Energy Harvesting Based Multi-Access Wireless Communications
   Sheng Luo; Haodi Zhang; Qifan Li; Kaishun Wu

3. Federated Learning With Dynamic Staleness Correction for Privacy Protection in Vehicular Networks
   Jiajia Liu; Hao Wu

4. Collaborative Mobile Charging Vehicles Placement: A Reinforcement Learning Approach
   JiaNing Ni; RuPeng Liang; Hao Wu

5. Collaborative Quantum Inspired Ant Colony Algorithm for Airport Taxiway Routing
   Ling Qian; Dan Li; Xu Chen; Panpan Ding

6. A Hybrid Model Combined With SVM and CNN for Community Content Classification
   Yukui Ye; Xia Xie; Hai Jin; Duoqiang Wang

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**HPCC-21: Distributed Intelligence for Future High Performance Unmanned Mobile Systems (I) (Special Session 2)**

**Session Chair: Jiuzhen Zeng, Huazhong University of Science and Technology, China**

1. An Improved RRT*-Based Real-Time Path Planning Algorithm for UAV
   Di Xu; Qian Hongyan; Zhang Shuheng

2. ASTC: An Adaptive Gradient Compression Scheme for Communication-Efficient Edge Computing
   Jun Wu; Yingchi Mao; Xuesong Xu

3. PAL-FD: An Efficient and Accurate Multi-Scene Human Face Detection Tool for Windows
   Shuai Xu; Zhelong Huang; Pinyi Qian; Jiacheng Cen; Donghai Guan

4. A Spatiotemporal Analysis of Age of Information at V2X-Enabled Intersection
   Yaying Wang; Guoping Tan; Siyuan Zhou; Dengsong Yang; Baili Ni

5. A Lightweight VK-Net Based on Motion Profiles for Hazardous Driving Scenario Identification
   Zhen Gao; Jingning Xu; Jiang Yu Zheng; Hongfei Fan; Rongjie Yu; JiaQi Zong; Xinyi Li

6. Pose Adaptive Margin Loss for Face Verification
   Jie Lei; BaiYan Zhang; Linglin Xia; Hefei Ling

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**HPCC-22: Distributed Intelligence for Future High Performance Unmanned Mobile Systems (II) (Special Session 2)**

**Session Chair: Junjie Su, Huazhong University of Science and Technology, China**

1. Reinforcement Learning-Based Black-Box Evasion Attacks to Link Prediction in Dynamic Graphs
   Houxiang Fan; Binghui Wang; Pan Zhou; Ang Li; Zichuan Xu; Cai Fu; Hai Li; Yiran Chen

2. Blockchain-Based Decentralized Federated Learning: A Secure and Privacy-Preserving System
   Shuang Zhao; Yalun Wu; Rui Sun; Xiaoaqi Qian; Dong Zi; Zhiqiang Xie; Endong Tong; Wenjia Niu; Jiqiang Liu; Zhen Han

3. Joint User Scheduling and Trajectory Planning for QoS in UAV-Based NOMA Networks
   Jia Li; Xiangping Bryce Zhai; Xin Liu

4. On Performance of Cooperative V2X Communication With Vehicular Platoon Systems
   Siyuan Zhou; Qianqian Wu; Guoping Tan; Dengsong Yang; Baili Ni

5. Adaptive Network Formation and Trajectory Optimization for Multi-UAV-Assisted Wireless Data Offloading
Meng Wang; Yusi Long; Shimin Gong; Jing Xu

6. Distributed Consensus Problem in Federated Learning Paradigm
Xin Yan; Yiming Qin; Xiaodong Hu

HPCC-23: Smart Systems and Applications Empowered by Computing, Communication and Control Technologies (I) (Special Session 3)
Session Chair: Ruonan Zhao, Huazhong University of Science and Technology, China
1. A Refined Lane Recognition Method Based on LiDAR and Its Verification
   Dong He; Kai Gao; Jin Xie; Ronghua Du; Haojie Li; Xunhao Li; Shuo Huang

2. Flocking of Battery-Powered Mobile Agents With Energy-Aware Potential Function
   Fu Jiang; Yaxin Xia; Heng Li; Zhongke Zhang; Xiaoyong Zhang; Jun Peng

3. An Energy Dispatch Mechanism Based on Double Auction With Multiple Rounds for a Microgrid
   Weirong Liu; Cheng Ma; Yijun Cheng; Fu Jiang; Jieqi Rong; Jun Peng

   Weirong Liu; Yujie Wang; Fu Jiang; Yijun Cheng; Jieqi Rong; Chenglong Wang; Jun Peng

5. DMF-MPC: A Dual-Stage and Multi-Step Forecasting Model Based Cooling System Control Method for Data Center Energy Cost Minimization
   Xinrui He; Weiduo Chen; Xiaoshe Dong; Qiang Wang; Jialin Liu; Fan Dong; Yuanqi Su

HPCC-24: Smart Systems and Applications Empowered by Computing, Communication and Control Technologies (II) (Special Session 3)
Session Chair: Jiuzhen Zeng, Huazhong University of Science and Technology, China
1. A Video Stitching System of Underwater Image
   Zhenyu Wang; Haoming Wu; Tianming Yu; Mengqin Fu; Bernie Liu; Jieren Cheng; Quanfeng Ye; Ni Zhang; Shuo Huang; Xingyue Lu; Kai Lu

2. Supercapacitor Digital Twin Management System Based on Cloud Environment
   Yingze Yang; QinXian Zhao; Dianzhu Gao; Jieqi Rong; YunSheng Fan; Heng Li; Jun Peng

3. A Novel Fatigue Driving Detection Method under the Mask-Wearing Condition
   Shengyi Lv; Hui Wang; Sirui Ni; Jiaying Li; Zeli Zhao; Yuhan Zhang; Yuchuan Cheng; Yingze Yang; Bernie Liu; Xiulai Li

4. Falsified CV Data Attack Detection Based on LSTM
   Kai Gao; Shuo Huang; Ronghua Du; Jin Xie; Xiangyu Cheng; Dong He

5. The Digital Twin Model of Chemical Production Systems in Smart Factories: A Case Study
   Heng Li; Zheng Liu; Wei Yuan; Guiheng Chen; XiaoLong Chen; Yingze Yang; Jun Peng

6. An Accurate and Interpretable Lifetime Prediction Method for Batteries Using Extreme Gradient Boosting Tree and TreeExplainer
   Fu Jiang; Youzhi He; Dianzhu Gao; Yun Zhou; Weirong Liu; Lisen Yan; Jun Peng

HPCC-25: Smart Systems and Applications Empowered by Computing, Communication and Control Techniques (III) (Special Session 3)
Session Chair: Junjie Su, Huazhong University of Science and Technology, China
1. SAI: Self-Adjusting Incremental Quantile Estimation for Sparse Training of Neural Networks on Hardware Accelerators
   Jianchao Yang; Mei Wen; Minjin Tang; Junzhong Shen; Chunyuan Zhang
2. EEG and Forehead EOG-Based Driver Fatigue Classification Using Sparse-Deep Belief Networks
   Jie Zhang; Nanfeng Xiao

3. Triple Extraction of Knowledge Graphs With DGWPN
   Yipei Song; Rongheng Lin; Hua Zou

4. BOFSanitizer: Efficient Locator and Detector for Buffer Overflow Vulnerability
   Wenzhi Wang; Meng Fan; Aimin Yu; Dan Meng

5. A Digital Twin Model for the Battery Management Systems of Electric Vehicles
   Heng Li; Muaaz Bin Kaleem; I-Ju Chiu; Dianzhu Gao; Jun Peng

6. Enhancing the Performance of Liquid State Machine With Time-Division Sampling and Reservoir Reconstructing
   Yuchen Qiu; Lei Wang; Xiaofan Chen; Lianhua Qu
The SmartCity 2021 Physical Presentation Program

**SmartCity-1: Smart City Systems (I)**
**Session Chair: Debin Liu, Huazhong University of Science and Technology, China**

1. Optimization Model for Collaborative Overhaul Workshop Scheduling Problem of Multiple EMUs
   Weijiao Zhang; Zhongkai Wang; Zhikai Jia; Hui Wang

2. Small Traffic Sign Detector in Real-Time Based on Improved YOLO-v4
   Tingting Yang; Chao Tong

3. Optimized Model and Algorithm for Scheduling Turnaround Routes of Electric Multiple Units
   Zhongkai Wang; Tianyun Shi; Weijiao Zhang; Hui Wang

4. High-Speed Train Intelligent Maintenance Pattern and Edge-Computing Perception Model
   Peng Sun; Weijiao Zhang; Zhikai Jia

5. HIVE: Route Optimization Problem of Automatic Delivery System With Mobile Depot and Multiple Drones
   Yao Liu; Xuening Chang; Yuzhen Zhou; Shuo Dang; Jianmai Shi; Zhong Liu

6. Adaptive Channel Detection for Full-Duplex Based IAB Systems on Unlicensed Channels
   Qi Qi Xiao; Zheyi Wu; Jiantao Yuan; Meng Zhou; Guanding Yu; Rui Yin

**SmartCity-2: Smart City Systems (II)**
**Session Chair: Junjie Su, Huazhong University of Science and Technology, China**

1. A Study of Evidence Cognition in the Simpson Case Towards Smart Justice
   Xuan Zhou; Xiqiong Wan; Yifei Pei; Xiaohua Hu; Weihui Dai

2. Improved Algorithm of Thermal Image Target Detection Based on Yolo v4
   Min Dong; Jia Gang; Gangcan Sun; Qi Xue

3. Robo-Sweeper: Bionics Based Unmanned Sweeper Platform
   Guanyu Chen; Pan Lv; Hong Li; Guoqing Yang

4. Simplification and Compression Method Based on Classified Sparse Sampling for LiDAR Point Cloud
   Jian Chen; YuFang Lin; YuanXiang Chen; Mingkui Zheng; YuYao Zhu

5. A Discrete Teaching-Learning-Based Optimization Algorithm for the Green Vehicle Routing Problem
   Xixia Sun; Xianglong Dai; Su Pan; Nan Bao; Ning Liu; Xiaoye Shi

**SmartCity-3: Enabling Technologies for Smart City (I)**
**Session Chair: Wei Xiang, Huazhong University of Science and Technology, China**

1. An Effective Metaheuristic for Partial Offloading and Resource Allocation in Multi-Device Mobile Edge Computing
   Weirong He; Suxiang Wu; Jin Sun

2. Convolutional Capsule Network Based In-Loop Filter for HEVC
   Mengqing Cao; Yue Yu; Jian Chen; Xiuzhi Yang; Zhifeng Chen

3. The Design and Implementation of Dust Monitoring System for Photovoltaic Power Generation
   Yu liang Chen; Jiali Ma; Yanhong Ma; Yingli Zhang; Xiaokang Zhou; Rui Zhou

4. Lifetime-Driven Scheduling of Security-Critical Internet-Of-Things Applications on Real-Time Heterogeneous Multicore Systems
   Yufan Shen; Kun Cao; Yangguang Cui; Chengliang Zhou; Gongxuan Zhang; Junlong Zhou
5. Microgrid Forecasting Using Multiple Deep Learning Models  
Daxelle Sakubu; Qi Liu

6. Model-Fusion-Based Sustainable Trust Assessment Method  
Liang Zhang; Yuan Fang; Jianqiao Sheng; Jingxuan Xu; Xin Ding

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**SmartCity-4: Big Data and Data Mining For City (I)**  
**Session Chair:** Yuan Gao, Huazhong University of Science and Technology, China

1. A CAN Bus Anomaly Detection Based on FLXGBoost Algorithm  
Jie Wang; Xiuliang Mo

Xinxiang Wang; Minglei Guan; Junjie Hu; Chenyang Tian; Hong Shi; Qingquan Li

3. Distributed Data-Driven Engine Framework Facing CPS Brain-Inspired Intelligent Transportation  
Zhengzhuang Yang; Mingyue Xu; Kaidi Zhao; Chao Yang; Huiyu Zhi; Xihou Zhang; Zhuoran Chen; Song Qiu; Dingding Han

4. Game Theoretical Bandwidth Allocation in UAV-UGV Collaborative Disaster Relief Networks  
Bincheng Ying; Zhou Su; Qichao Xu; Xiandong Ma

Assadig Abdelrhman Sajo; Xiaoge Huang; Moatssim Saif; Qianbin Chen

6. Cooperative Task Offloading for Internet of Vehicles in Cloud-Edge Computing  
Linjie Gu; Xiaolong Xu; Lianyong Qi; Yiwen Zhang; Xuyun Zhang; Wanchun Dou

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**SmartCity-5: Big Data and Data Mining For City (II)**  
**Session Chair:** Ning Zhang, Huazhong University of Science and Technology, China

1. Short-Term Speed Prediction of Urban Roads Based on Multi-Source Feature Fusion  
Silin Liu; Zhuhua Liao; Yizhi Liu; Aiping Yi

2. A Spatial-Temporal Similar Graph Attention Network for Cyber Physical System Perception via Traffic Forecasting  
Kaidi Zhao; Mingyue Xu; Zhengzhuang Yang; Dingding Han

3. A Lightweight Enterprise Messaging Service at the Edge  
Tingjuan Lu; Jingjing Chen; Ying Zhang; Jia Luo; Tao Wang; Hangyi Chen

4. ZombieCoin3.0: On the Looming of a Novel Botnet Fortified by Distributed Ledger Technology and Internet of Things  
Haoyu Gao; Leixiao Li; Hao Lin; Xiangyang Chang; Jianxiong Wan; Jie Li; Fangyuan Zhu

5. The Latest Progress of Research on the Urban Functional Areas Based on CiteSpace Methods  
Yanru Hu; Changfeng Jing

6. A Comparative Study of Time Series Data Forecasting Using Machine Learning Based on Improved Grey Model  
Yan Li; JiaMing Zhang; Yanhong Ma; Xiaomin Li; Ziang Liu; Xiaokang Zhou; Rui Zhou

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**SmartCity-6: Big Data and Data Mining For City (III)**  
**Session Chair:** Yuan Gao, Huazhong University of Science and Technology, China

1. Few-Shot Malicious Traffic Classification Based on Siamese Neural Network  
Kailin Wu; Pan Wang; ZiXuan Wang

2. A Deep Image Denoising Method at Transmit Electricity Surveillance Environment  
Nan Yao; Ziquan Liu; Zhen Wang; Yongling Lu; Jianhua Qin
3. Trust Evaluation Based on Variable Weight Synthesis
Mu Chen; Lu Chen; Zaoqian Dai; Zhipeng Shao; Yuanyuan Ma

4. Target Detection of Engineering Vehicles Based on Co-Learning Labels
Zhen Wang; Nan Yao; Ziquan Liu; Xueqiong Zhu; Hai Xue

5. A Mobile Internet Multi-Level Two-Way Identity Authentication Scheme Based on Zero Trust
Lu Chen; Yuwei Sun; Zhixin Sun

6. An Explainable Intrusion Detection System
Yun Wang; Pan Wang; ZiXuan Wang; Mengting Cao

SmartCity-7: Big Data and Data Mining For City (IV)
Session Chair: Xin Nie, Huazhong University of Science and Technology, China
1. Semantic Segmentation of Remote Sensing Image Based on Two-Time Augmentation and Atrous Convolution
Ruiqi Yang; Yue Zhang; Haiyan Cheng; Yili Zhao; Qinling Dai; Nan Chen

2. DeepLoc: A Deep Neural Network-Based Indoor Positioning Framework
Saining Liu; Qianqian Ren; Jinbao Li; Hui Xu

3. Fast Distributed Stochastic Gradient Descent for Big Data Classification
Mingfei Xiao; Huihui Wang

4. GNAS: Generalized Neural Attentive Similarity Model for Recommendation
Zhilin Cheng; Yanxia Lyu; Jiemin Liu; Cong Wang

5. Experience-Based Pickup Area Recommendation on Taxi’s GPS Trajectories
Zhuhua Liao; Jian Zhang; Aiping Yi; Yizhi Liu; Yijiang Zhao; Silin Liu

6. Design and Implementation of Monitoring System for New Energy Data Call Based on Blockchain
Ziang Liu; Yuanyuan Huang; Qiang Zhou; Yingli Zhang; Xiaokang Zhou; Rui Zhou

SmartCity-8: Big Data and Data Mining For City (V)
Session Chair: Ziheng Xiao, Huazhong University of Science and Technology, China
1. Blind Image Quality Assessment Based on Multi-Scale Spatial Pyramid Pooling
Fangfang Lu; Feng Qin; Jingjing Chen

2. A Comprehensive Study of Present Data Deduplication
Zilong Xue; Huixun Qian; Lingling Shen; Xiaotong Wu

3. EEAI: An End-Edge Architecture for Accelerating Deep Neural Network Inference
Guozhi Liu; Fei Dai; Bi Huang; Zhenping Qiang; Lecheng Li; Shuai Wang

4. SA_3AM: A Novel Sentiment Analysis Approach Integrating Three-Level Attention Mechanism
Qingren Wang; Liang Sun; Jie Cui; Jing Zhang

5. Photovoltaic Power Forecasting in Dunhuang Based on Recurrent Neural Network
Qingquan Lv; Ming Ma; Xuetao Jiang; Meiyu Jiang; Binbin Yong; Jun Shen; Qingguo Zhou

SmartCity-9: Smart City Services (I)
Session Chair: Yunzhi Xia, Huazhong University of Science and Technology, China
1. UAV-USV Cooperative Task Allocation for Smart Ocean Networks
Juan Liu; Zhou Su; Qichao Xu

2. Analysis and Prediction Transient Population in Expressway Service Area Based Long Short-Term Memory
Jin-Qiang Wang; Kai Zhang; Peng Zhi; Guolong Xi; Xiaorun Tang; Qingguo Zhou

3. Remote Sensing Identification of Seasonal Pasture Based on Sentinel-2
Shiqi Su; Panfei Fang; Pengfei Zheng; Rui Qian; Zhenping Qiang

4. Lane-Level Traffic Flow Prediction Based on Dynamic Graph Generation
Lingyun Wang; Guojiang Shen; Kaifeng Yu; Zhanhao Ji; Xiangjie Kong

5. Citizen-Centric Smart Campuses: Supporting Events Information for People
Xiaoyan Wei

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1. Personalized English Lexical Simplification for Chinese
Yujie Yin; Feng Zhang; Yun Li; Jing Zhang; Jipeng Qiang

2. Click Prediction Based on Feature Fusion and Attention Mechanism
Guoning Zhao; Chunyang Ye; Qidi Zhang; Hui Zhou

3. Research on Single Image Deraining Algorithm Based on Euclidean Distance With Adaptive Progressive Residual Network
Xingzhi Chen; Ruiqiang Ma; Zehui Dong

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1. HANA-MES: A HMI-Awared Manufacturing Execution System
Jingjing Chen; Hequn Wu; Yafei Li; Xiaoxin Wu; Yueqiang Zhao; Yao Shi; Songjia Tang; Yulun Shi; Hangyi Chen

2. TSITE IP: A Case Study of Intellectual Property Distributed Platform Based on Cloud Services
Yang Wang

3. Infrared and Visible Image Fusion Based on Deep Gradient Constraint Driven Network
Ze Wang; Guoxia Xu

4. Performance Analysis of Turbo Codes for 5G Massive Machine-Type Communication (mMTC)
Mohammed Jajere Adamu; Li Qiang; Rabiu Sale Zakariyya; Adamu Halliu Jabire; Halima Bello Kawuwa; Sani Saminu

5. Multigranularity Multiclass-Layer Markov Random Field Model for Improving Remote Sensing Image Classification
Jun Wang; Haoyu Fu; Cheng Zhen; Leiguang Wang; Qinling Dai

6. The Impact of Parameters on Semantic Segmentation: A Case Study on the CamVid Dataset
Yue Zhang; Ruiqi Yang; Jun Wang; Nan Chen; Qinling Dai

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1. Traffic Anomaly Detection Model of Electric Power Industrial Control Based on DBN-LSTM
Shijun Zhang; Ji Lai; Qigui Yao

2. Sentiments Affect Stock Returns: Evidence Based on Big Data
Jing Sun; Yingying Xu; Yueqiang Zhao; Yuliang Zhou; Jaime Ortiz; Weipeng Chen

3. Cascaded Based Adaptive R-CNN Network for Insulator Defect Detection
Nan Yao; Guangrui Shan; Jianya Pan; Zhen Wang; Xueqiong Zhu
4. An Improved Bi-LSTM Model for Entity Extraction of Intellectual Property Using Complex Graph
   Youning Wang; Qi Liu; Yang Wang

5. Pluralistic Face Image Completion Based on StyleGAN
   Xiaofeng Shao; Zhenping Qiang; Fei Dai; Shiqi Su; Yuxuan Zuo; Libo He

SmartCity-13: Smart Systems (Short Paper)
Session Chair: Yixuan Geng, Huazhong University of Science and Technology, China

1. Improved ORB Mismatch Elimination Based on Gradient Cosine
   Zhao Cheng Huang; Lei Liu; Lanyao Qin; Yonglin Huang; Sha Lan; Yi Xiang; Xiaopeng Xie; Changjin Guo

2. Innovative Digital Twin Platform Construction for Smart Grid System
   Yiguo Zhong; Wei Zhang; Xueping Ha; Qinghai Chen; Jing Huang; Ke Yan

3. A Handover Self-Optimization Mobility Load Balancing for Ultra-Dense Networks
   Yujie Li; Zhoujin Tang; Jian Sun; Xiaolong Yang; Shuo Chen
# The DSS 2021 Physical Presentation Program

## DSS-1: Data Science and Systems
**Session Chair: Zecan Yang, Huazhong University of Science and Technology, China**

1. **A Convolutional Generative Adversarial Framework for Data Augmentation Based on a Robust Optimal Transport Metric**  
   Liyilei Su; Xianjun Fu; Qingmao Hu

2. **An Emotion Guidance Decision-Making Model Based on Dialogue Context**  
   Zhiqiang Ma; Wenchao Jia; Baoxiang Du; Chunyu Wang

3. **BRB-Based Distributed Fault Diagnosis for Consensus of Heterogeneous Multi-Agent Systems**  
   Ruohan Yang; Zhichao Feng

4. **Local-Global-Aware Convolutional Transformer for Hyperspectral Image Classification**  
   Yifan Wang; Zhichao Min; Sen Jia

5. **Chinese Relation Extraction of Apple Diseases and Pests Based on A Dual-Channel Neural Network**  
   Mei Guo; Jiayu Zhang; Mei Li; Yaojun Geng; Nan Geng

6. **Digital Twin Mobility Profiling: A Spatio-Temporal Graph Learning Approach**  
   Xin Chen; Mingliang Hou; Tao Tang; Achhardeep Kaur; Feng Xia

## DSS-2: Data Science and Systems (Short Paper)
**Session Chair: Zecan Yang, Huazhong University of Science and Technology, China**

1. **Organs-At-Risk Segmentation in Medical Imaging Based on the U-Net With Residual and Attention Mechanism**  
   XiaoWei Lin; Ni Li; Qi Qi

2. **Multiscale Spatial-Spectral Joint Feature Learning for Multispectral and Hyperspectral Image Fusion**  
   Zhichao Min; Yifan Wang; Sen Jia

3. **Spatial-Temporal-Spectral Transformer for 3D Human Pose Estimation**  
   Yongpeng Wu; Dehui Kong; Shaofan Wang; Jinghua Li; Baocai Yin
The DependSys 2021 Physical Presentation Program

**DependSys-1: Security Fundamentals and Technologies**  
**Session Chair: Yuan Gao, Huazhong University of Science and Technology, China**

1. Application of Deep Reinforcement Learning in Optimization of Traffic Signal Control  
Jian Huang; Wei Wang; Lirong Wang; Hui Chen; Qingshan Deng; Heying Fan; Yaohua Yu

2. An Improved Slime Mould Algorithm with Quasi Reflection-Based Learning for Global Optimization Problems  
Qingxin Liu; Qi Qi; Heming Jia; Ni Li

3. Multi-objective Optimization Regression Verification for Multi-core Cache Coherence Protocol  
Li Luo; Ying zhang; Hongjun He; Lei Wang; Changqing Xun; Guoteng Pan; Junbo Tie; Huili Hu

4. Parallel LSTM Enhanced Forecasting System for Dependable and Secure Household Energy Consumption  
Ke Yan; Fan Yang; Xiaokang Zhou; Wei Liang

**DependSys-2: Security Fundamentals and Technologies (Short Paper)**  
**Session Chair: Xin Nie, Huazhong University of Science and Technology, China**

1. Study on Active Defense of Honeypot-Based Industrial Control Network  
Xunsi Wei; Dequan Yang

2. Design of Functional Safety Pressure Transmitter and Safety Assessment  
Bingjun Yan; Xiufang Zhou; Bo Zhang; Zhiping Wang

3. A Survey on Failure Prediction in Large-scale Computing Systems  
Fei Xia; Hu Song; Long-Chuan Yan; Yan Li; Li-Jun Wang
The GPC 2021 Physical Presentation Program

**GPC-1: Intelligent Sensing and Computing**  
**Session Chair: Bocheng Ren, Huazhong University of Science and Technology, China**

1. Local Interaction and Global Guidance Based Low and High-Level Feature Fusion for RGB-D Fixation Prediction  
   Xinyue Zhang; Ting Jin; Mingjie Han; Jingsheng Lei

   Yixuan Luo; Zhiwen Yu; Jiaju Ren; Bin Guo

3. PipePrune: Pipeline Parallel Based on Convolutional Layer Pruning for Distributed Deep Learning  
   Daojun Tan; Wenbin Jiang; Shang Qin; Hai Jin

4. Cooperative Relationship Prediction Between Scholars in Heterogeneous Academic Network  
   Jia Shi; Hai Jin; Xia Xie

5. A Novel Optimized Asynchronous Federated Learning Framework  
   ZhiCheng Zhou

6. Forwarding Policy Verification of Hybrid Multi-Domain Software Defined Network  
   Jiangyuan Yao; Zheng Jiang; WeiPing Yang; Minrui Wang; Deshun Li

**GPC-2: Pervasive and Green Applications (I)**  
**Session Chair: Ning Zhang, Huazhong University of Science and Technology, China**

1. MetaProfiling: Inferring User Profiles With Few-Shot Data  
   Yueqi Sun; Bin Guo; Nuo Li; Yi Ouyang; Xiaona Li; Jiayu Xie; Zhu Wang; Zhiwen Yu

2. Joint Energy and Computation Workload Management for Geo-Distributed Data Centers in Smart Grid  
   Zizhen Li; Ran Wang; Kun Zhu; Changyan Yi; Linfeng Liu; Dusit Niyato

3. Quantitative Assessment of Limb Stability From Handwriting Images  
   Zhifei He; Luchuan Zeng; Ruijiang Xie; Keyi Li; Hai Su; Jie Lei; Lan Li; Linglin Xia; Deyu Lin

**GPC-3: Pervasive and Green Applications (II) (Short Paper)**  
**Session Chair: Bocheng Ren, Huazhong University of Science and Technology, China**

1. Exploring Self-Supervised Learning for Radio Signal Recognition  
   Xingtong Yun; Xin Zhou

2. A Novel CNN-LSTM Method for Ship Trajectory Prediction  
   Bingqing Lu; Rongheng Lin; Hua Zou

   Zhuoran Kang; Rongheng Lin; Hua Zou; Xiaowei Liu; Rui Jiao

4. Modeling Analysis Based on Live Broadcast Paid Gifting Behavior  
   Na Wang; Zhiwen Yu; Bin Guo

5. A Dynamic Routing Strategy for Hybrid Power Communication Networks  
   Zengqing Qi; Jingpeng Xiao; Zhiqiang Xu
The DIKW 2021 Physical Presentation Program

**DIKW-1: Artificial Intelligence**
*Session Chair: Wei Xiang, Huazhong University of Science and Technology, China*

1. A Method for Improving the Effect of Base Station Energy Saving With AI
   Jingjing Yuan; Le Zhang; Tiantian Lv; Yanqin Wu

2. Purpose Driven Balancing of Fairness for Emotional Content Transfer over DIKW
   Ting Hu; Yucong Duan; Yingtian Mei

3. Sentiment Analysis Method Based on Deep Learning in Adversarial Environment
   Jiamin Lv; Lei Yu; Yucong Duan

4. MDistMult: A Multiple Scoring Functions Model for Link Prediction on Antiviral Drugs Knowledge Graph
   Weichuan Wang; Zhiwen Xie; Jin Liu; Yucong Duan; Bo Huang; Junsheng Zhang

5. Construction and Optimization of Medical Question Answering System Based on Knowledge Graph
   Bing Gao; Haoxiong Wang; Qijie Zou; Jing Qin

**DIKW-2: Networks, Algorithms and Graph**
*Session Chair: Bocheng Ren, Huazhong University of Science and Technology, China*

1. Long-Term Change Characteristics and Mechanism Analysis of Salinity in Section B1 of Bohai Sea
   Yan Li; Huaming Yu, Xuechao Zhang; Ge Li; Min Bao

2. A Study on the Health Status of Cherry Production in Multi-Factor Facilities Based on the Attention Mechanism Bi-LSTM
   Chao Zhang; Lingyan Hu; Zumin Wang; Yan Liu; Zhanjun Guo; Guoqiang Li

3. Cherry Detection Algorithm Based on Improved YOLOv5s Network
   Rongli Gai; Mengke Li; Na Chen

4. Research on Acceleration and Deceleration Control Algorithm of S-Curve
   Rongli Gai; Yitong Guo

**DIKW-3: Blockchain**
*Session Chair: Minghua Wang, University of South China, China*

1. A Multiple-Blockchains Based Service Monitoring Framework in Edge-Cloud Computing
   Hang Fu; Puwei Wang; Ying Zhan; Jinchuan Chen; Xiaoyong Du

2. Recognize Illegal Transactions in the Bitcoin Network Using Graph Convolution with DIKW
   Haixiao Zheng; Bin Wen; Yuhan Li

3. Data and Information Fusion Oriented Outline Driven Framework for Clause Extraction from Electronic Insurance Contracts
   Zhifeng Duan; Bin Xu; Zhengwu Wu; Yucong Duan; Chengxiang Ren

4. A Power Consumption Perception and Dynamic Adjustment Model for Embedded Real-Time Systems
   Yingjie Wang; Fengbo Bai; Zumin Wang; Zixu Wang; Zizhong Wang

5. A Study on 3D Multimodal Resonance Brain Tumor Image Segmentation Model
   Lei Dong; Zumin Wang; Min Zhang; Bing Gao

**DIKW-4: Data-Information-Knowledge-Wisdom (Special Invited Session Papers)**
*Session Chair: Wei Xiang, Huazhong University of Science and Technology, China*

1. DIKW Upward Enabling Manufacturing from Digitalization in Industry 3.0 to Wisdom in Industry 4.0
   Xifan Yao; Kesai Wang; Nanfeng Ma; Haifeng Mai; Yansong Huang; Erfu Yang

2. Analysis of Evolutionary Model of DIKW Based on Cloud Resource Allocation Management
3. Reconstruction of Smart Meteorological Service Based on DIKW
Liang Chen; XiaoWen Wei; ShengBei Chen; Yucong Duan

4. How Do We Move Towards True Artificial Intelligence
Wei Liu; Guangda Zhuang; Xin Liu; Shaobo Hu; Rulin He; Yuhu Wang

5. Innovative Evaluation Model Based on Improved AHP Weighted Principal Component Analysis
Yu Zhang

**DIKW-5: Analysis and Natural Phenomena (Special Invited Session Papers and Short Paper)**
*Session Chair: Ziheng Xiao, Huazhong University of Science and Technology, China*

1. Research on Moving Target Detection in Complex Weather
Zhaqiqi Yan; Rongli Gai

2. Research of Seismic Streaming Storage Based on Druid
Bing Gao; Jie Chen; Qijie Zou; Jing Qin

3. Characteristics of 26 Strong Long-Lived Convective Cells in Shandong
Feiyan Guo; Xiuguang Diao; Han Yao; Huaji Pang; Manman Xing

Linxuan Xin; Jiantao Zhou; Lei Yu

5. Applying of Graph Neural Network in Relationship Prediction in Knowledge Graph Reasoning
Jiahao Li; Wenbo Xu

**DIKW-6: Weather Forecast (Short Paper)**
*Session Chair: Yunzhi Xia, Huazhong University of Science and Technology, China*

1. Evaluation of ART_V1.0 and ART_V1.1 Datasets Over Hainan Island and South China Sea
Yi Jiang; Chunxiang Shi; Shuai Han; Zihao Pang; Honghui Zheng

2. Application Research of Naive Bayes Algorithm Based on DIKW in Weather Website
ChaoNing Li; Liang Chen; Shenghong Wu; Yunyin Mo; Liying Chen

3. Analysis of a Severe Convective Weather Process Based on Potential Vorticity Theory on 13 June 2018
Huaji Pang; Han Yao; Feiyan Guo; Fujing Wan; Shudong Wang; Guoping Zhang

4. Supercell Storm and Extreme Wind in a Linear Mesoscale Convective System
Fujing Wan; Zhifeng Liu; Huaji Pang

5. Lightning Prediction and Environment Factor Analysis Using Random Forest Algorithm in Shandong Province, China
Han Yao; Feiyan Guo; Lin Song; Huaji Pang

**DIKW-7: Database Performance (Short Paper)**
*Session Chair: Honglu Zhao, Fujian Agriculture and Forestry University, China*

Tiantian Lv; Yanqin Wu; Le Zhang; Jingjing Yuan

2. Distributed HBase Cluster Storage Engine and Database Performance Optimization
Hao Zhang; Rongli Gai

3. Survey of Performance Comparison Based on Non Relational Database
Jingbo Li; Rongli Gai
4. Survey on Query Optimization of GPU Database
Jiahui Yang; Rongli Gai; Liming Duan

DIKW-8: Wind Forecast (Short Paper)
Session Chair: Zecan Yang, Huazhong University of Science and Technology, China
1. Wind Speed Forecasting Method Based on Deep Learning Strategy Using Long Short Term Memory Neural Network and Transformer Model
Zhifeng Liu; Feng Ding; Fujing Wan

2. Analysis of the Impact of Offshore Wind Power Development on Marine Ecological Environment Based on Observation Data
Yanni Wang; Huaming Yu; Yaocheng Deng; Ge Li; Min Bao; Zhuan Zhou

3. Comparative Experiment of Several Quantitative Precipitation Estimation Techniques Based on Doppler Radar Over the Hainan Island During Typhoon
Lingyu Dong; Xiaobin Lin

4. Improvement of the Data Assimilation Scheme for Sea Surface Wind Speed Products
Xiaoyan Liu; Bin Xu; Zhihong Liao; Chunxiang Shi

DIKW-9: Data-Information-Knowledge-Wisdom (Short Paper)
Session Chair: Yunzhi Xia, Huazhong University of Science and Technology, China
1. Service Recommendation Based on DIKW Pyramid
Jiamin Lv; Lei Yu; Yucong Duan

2. Fairness Modelling, Checking and Adjustment for Purpose Driven Content Filling Over DIKW
Yue Huang; Yucong Duan

3. Purpose-Driven Content Network Transmission Protocol Crossing DIKW Modals
Yuxiao Lei; Yucong Duan

4. Summary of Water Quality Prediction Models Based on Machine Learning
Rongli Gai; Jiahui Yang

5. The Application of Augmented Reality Technology in Museum Display Design
Junjie Zhang; Jianru Shang; Hong Yan
The Hyper-Intelligence Congress 2021

IEEE HPCC/SmartCity/DSS/DependSys/GPC/DIKW-2021

Online Presentation Program
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<td>10:00-10:20</td>
<td>Coffee Break</td>
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<td>10:20-11:00</td>
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<td>Linfu Sun, Southwest Jiaotong University, China</td>
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<td><strong>Keynote 2:</strong> Advanced Applications of Brain Science + AI + Grid Edge Supercomputing</td>
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<td>Steve Chen, 3rd Brain Research Institute, USA</td>
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<td><strong>Keynote 3:</strong> Beef Up the Edge: Building a Service Network for Sensing, Communications, Computing, Storage and Intelligence at the Edge</td>
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<td>12:20-14:30</td>
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<td><strong>Keynote 4:</strong> AI Everywhere: From Cloud Computing to Edge Computing</td>
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<td>15:10-15:50</td>
<td><strong>Keynote 5:</strong> Deep Learning-Based Vulnerability Detection for Open-Source Software</td>
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<td>Deqing Zou, Huazhong University of Science and Technology, China</td>
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<td><strong>Keynote 6:</strong> Edge Intelligence – Engineering the New Fabric of IoT, Edge, and Cloud</td>
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<td>Schahram Dustdar, Vienna Technical University, Austria</td>
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<td>Chaired by Qingchen Zhang, Hainan University, China</td>
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<td>16:30-16:50</td>
<td>Coffee Break</td>
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<td>16:50-17:30</td>
<td><strong>Keynote 7:</strong> Practice and Exploration of Industry and Finance Platform Based on the IoT</td>
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<td>Gang Xia, CEC Industrial Internet, China</td>
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<td>Chaired by Hua Li, Hainan University, China</td>
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<td>17:30-18:10</td>
<td><strong>Keynote 8:</strong> 5G-Lead, Data &amp; Intelligence-Driven, Digital Twins Shape the New Pattern of Smart City</td>
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<td>Jinzhou Yang, China Unicom, China</td>
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<td>Chaired by Bang Wang, Huazhong University of Science and Technology, China</td>
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<td>Reception</td>
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<td>19:50-20:05</td>
<td>Coffee Break</td>
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<td>20:05-21:55</td>
<td>SmartCity-15: Big Data and Smart Systems (I)</td>
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### SmartCity-14: Smart City Technologies (I) (Regular Paper)
**Session Chair:** Yuanyuan He, Huazhong University of Science and technology, China

1. **Short-Term Traffic Flow Forecast Using Regression Analysis and Graph Convolutional Neural Networks**  
   Daniel Klosa; Amin Mallek; Christof Büskens

2. **Towards Applying IPSec Between Edge Switches and End Users to Counter DDoS Attacks in SDNs**  
   Abdullah Soliman Alshra‘a; Jochen Seitz

3. **Intelligent Question Answering System Based on Knowledge Graph**  
   Xijin Feng; Qi Liu; Xiaodong Liu

4. **Rethinking Deep Packet Inspection Design and Deployment in the Era of SDN and NFV**  
   Hanan Mustapha; Soufiene Djahel; Philip Perry; Zonghua Zhang

### SmartCity-15: Big Data and Smart Systems (I) (Short Paper)
**Session Chair:** Weifeng Zhong, Guangdong University of Technology, China

1. **An Ontology for an IoT-Enabled Smart Library in a University Campus**  
   Soulakshmee Devi Nagowah; Hatem Ben Sta; Baby Ashwin Gobin-Rahimbux

2. **Implementation of a Smart Canteen System for a University Campus**  
   Jaya Laxmi Ramiah; Soulakshmee Devi Nagowah

3. **Developing an Integrated Data Model Based on IFC and SensorML for Post-COVID Facility Management**  
   Vincent J.L. Gan; Tao Wang; Difeng Hu; Chao Yin

4. **Intelligent and Automated Fault Detection and Diagnosis Strategy for HVAC Systems Based on Maintainability Rules for Construction 4.0**  
   Michael Chew; Ke Yan

### HYPER-INTELLIGENCE-1: High Performance Computing and Smart Data (I) (Regular Paper)
**Session Chair:** Yuanyuan He, Huazhong University of Science and technology, China

1. **HyperOXN: Topology and Scheduling for Efficient Large-Scale Networks**  
   Timothy Yuan; Dan Ionescu

2. **QHash: An Efficient Hashing Algorithm for Low-Variance Image Deduplication**  
   Xuan Li; Liqiong Chang; Xue Liu

3. **Characterization and Implication of Edge WebAssembly Runtimes**  
   Zhen Wang; Jianda Wang; Zhendong Wang; Yang Hu

4. **Smart City Traffic Intersection: Impact of Video Quality and Scene Complexity on Precision and Inference**  
   Zhuoxu Duan; Zhengye Yang; Richard Samoilenko; Dwiref Snehal Oza; Ashvin Jagadeesan; Mingfei Sun; Hongzhe Ye; Zihao Xiong; Gil Zussman; Zoran Kostic

5. **An Ensemble-Based Weight-Learning Framework and Algorithm for Imputing Missing Values on High-Dimension Low-Sample Size Datasets**  
   Chun-Kit Ngan; Boyuan Yang

6. **Knowledge Engineering in the Social Era**  
   Ejub Kajan; Zakaria Maamar
1. A Comprehensive Overview on IoT-Based Smart Stroke Rehabilitation Using the Advances of Wearable Technology
Najmeh Razfar; Rasha Kashef; Farah Mohammadi

2. Deep Learning-Based Semantic Segmentation in Autonomous Driving
Hrag Harout Jebramikyous; Rasha Kashef

Najmeh Razfar; Rasha Kashef; Farah Mohammadi

4. Big Data Mining on Health Informatic Data for Cities
Carson K. Leung; Qi Wen; Chenru Zhao

5. Design and Implementation of a Distributed Control Platform for a Smart Building Testbed
Nathan Puryear; Mostafa Zaman; Roja Eini; Sherif Abdelwahed

Budi Aditya Bhat; Rajesh Kumar

2. TAGCN: Typed Attention Graph Convolutional Networks for Entity Alignment in Cross-Lingual Knowledge Graphs
Jianliang Gao; Zhao Li; Fan Xiong; Xiangyue Liu; Jie Xiao; Biao Wang; Ji Zhang

3. Automatic Semantic Modeling for Structural Data Source with the Prior Knowledge from Knowledge Graph
Zaiwen Feng; Jiakang Xu; Wolfgang Mayer; Wangyu Huang; Keqing He; Markus Stumptner; Georg Grossmann; Hongyu Zhang; Lin Ling

4. Multi-Agent Deep Reinforcement Learning Based Consistency Control in Train Platoon Systems
Xinran Zhang; Gaofeng Nie; Wanli Ni; Hui Tian

1. On-Camera Content Filtering for Real-Time Video Analytics
Fahao Chen; Peng Li; Celimuge Wu

2. Fault Diagnosis of Rolling Bearing Using Multiscale Fusion Convolutional Neural Network
Mengyuan Ren; Yiming He; Qiang Wang; Jingtao Sun

3. Driving Gaze Behavior Prediction at S-Curve Based on Driver Experience Using Machine Learning
Chrispus Oroni; Yishui Zhu; Luyang Wang; Bo Wu

4. Intelligent Live Video Streaming for Object Detection
Mingkang Chen; Jingtao Sun; Kento Aida; Renato Figueiredo; Yun-Jung Ku; Kensworth Subratie

5. Classifying Dominant Tree Species Over a Large Mountainous Area Based on Multi-Temporal Sentinel-2 Data
Pengfei Zhong; Panfei Fang; PeiWei Liu; Qinling Dai; Jin Li

1. Short-Term Financial Data Prediction by Long-Term Regression
Mahmoud. Mesleh; Mustafa Serkan Kiranyaz
2. Convex Non-Negative Matrix Factorization Through Quantum Annealing
Zaiou Ahmed; Matei Basarab; Bennani Younès; Hibti Mohamed

3. A Filter is Better Than None: Improving Deep Learning-Based Product Recommendation Models by Using a User Preference Filter
Miguel Alves Gomes; Hasan Tercan; Todd Bodnar; Philipp Meisen; Tobias Meisen

4. A Case-Based Reasoning Solution for Computational Urban Drinking Water Quality Control
Di Wu; Hao Wang; Razak Seidu; Xiaojuan Ban

5. A Deep Learning Approach for Intrusion Detection
Roua Dhabhi; Farah Jemili

6. Global Definition of Information for Global Communication
Wolfgang Orthuber

Hyper-Intelligence-4: Communications and Data Processing (I) (Regular Paper)
Session Chair: Weijun Wang, University of Göttingen, Germany
1. MGGAN: Improving Sample Generations of Generative Adversarial Networks
Hao Wu; Ligang He; Chang-Tsun Li; Junyu Li; Wentai Wu; Carsten Maple

2. On-The-Fly Servers Placement for Online Multiplayer Games in the Fog
Amira Rayane Benamer; Hadj-Alouane Nejib; Boussetta Khaled

3. Automated Human Activity Recognition by Colliding Bodies Optimization(CBO)-Based Optimal Feature Selection with RNN
Ayan Chatterjee; Ayan Chatterjee; Matrika Subedi

4. Perceiving the Narrative Style for Fake News Detection Using Deep Learning
Mengtao Sun; Ibrahim Hameed; Hao Wang; Mark Pasquine

5. Collaborative Random Forests Learning
Yohan Foucadel; Younes Bennani; Zakaria Aabbou

Hyper-Intelligence-5: Smart Systems and Data Science (II) (Short Paper)
Session Chair: Junyu Lu, Sichuan University, China
1. RoboMaze: Swarm Robotics and Coordinated Navigation in Smart City
John Song; Austin Z Song; Fumin Zhang

2. Deep Learning Transforming the Manufacturing Industry, A Case Study
1. Efficient Comorbidity Analysis in Brain Disorders Reveals Better Diagnosis
   Menglu Li; Maryam Amirizaniani; Rasha Kashef

2. Enhance COVID-19 Mortality Prediction With Human Mobility Trend and Medical Information
   Yogesh Chaudhari; Indrajeet Javeri; Ismailcem Arpinar; John A. Miller; John A. Miller Li; Bingnan Li; Yuan Ke; Mohammadhossein Toutiaee; Nicole Lazar

3. Behavioural Monitoring and Security Profiling in the Internet of Things (IoT)
   Miraqa Safi; Barjinder Kaur; Sajjad Dadkhah; Farzaneh Shoeleh; Arash Habibi Lashkari; Heather Molyneaux; Ali A. Ghorbani

4. False Data Injection Attack Detection Based on Wavelet Packet Decomposition and Random Forest in Smart Grid
   Zhenyu Chen; Shuai Yuan; Longfei Wu; Zhita Guan; Xiaojiang Du

5. A Data-Driven Password Strength Meter for Cybersecurity Assessment and Enhancement
   Moath M. Algharibeh; Ghaith Husari; Sardar Jaf

1. TLM-NoC: Two Level Mesh Network-On-Chip for Performance Improvement
   Gagan N; Biswajit Bhowmik

   Risira Daksith Jayasinghe

3. An Allocation Method of Crowdsourcing Tasks for Protecting Fairness of Participants
   Lei Xiao; Zhigang Gao; Ruichao Xu; Bo Wu; Leilei Zheng; Wei Zhao; Weipeng Cen; Xuanzhang He

4. Service Design With Machine Learning Based on User Action History (Comparison and Visualization of Differences in Running Motion With Dynamic Time Warping)
   Xinyue Wang; Nobutada Fujii; Ruriko Watanabe; Daisuke Kokuryo; Toshiya Kajihara

5. Keynote: Computing Amplification Factors for Influence on Social Network Based on Learning of Behaviors and Interacted Knowledge Graph
   Hien D Nguyen; Quan M Tran; Vuong Pham; Tai Huynh

6. Intelligent Black Ice Detection and Alert System Using Thermal Imaging Camera and Drone
   Yanan Xu; Dexiang Yao; Xue Ren; Yunhai Dai

1. Three Edge-Disjoint Hamiltonian Cycles in Crossed Cubes With Applications to Fault-Tolerant Data Broadcasting
   Kung-Jui Pai; Ro-Yu Wu; Sheng-Lung Peng; Jou-Ming Chang
2. A Spatial-Temporal Model for Tourism Demand Forecasting
Yunxuan Dong; Binggui Zhou; Guanghua Yang; Fen Hou; Shaodan Ma

3. Migrating Deep Learning Data and Applications among Kubernetes Edge Nodes
Suchanat Mangkhangcharoen; Jason Haga; Prapaporn Rattanatamrong

4. QHSL Image Encryption Scheme Based on a Logistic Chaotic System
Fei Yan; Mao Li; Nianqiao Li; Abdullah M. Iliyasu

5. Multi-Agent Deep Reinforcement Learning for Traffic Signal Control With Nash Equilibrium
Wei Wei; Qiang Wu; Jianqing Wu; Bo Du; Jun Shen; Tinghong Li

**HPCC-26: Smart Computing (Short Paper and Special Session)**
**Session Chair: Shenghao Liu, Huazhong University of Science and technology, China**

1. Execution- and Prediction-Based Auto-Tuning of Parallel Read and Write Parameters
Megha Agarwal; Pragya Jain; Divyansh Singhvi; Preeti Malakar

2. Energy Efficient and QoS Aware Multi-Level Mobile Cloud Offloading
Vaibhav Gupta; Aryabartta Sahu; Chinmaya Kumar Swain

3. pmcEDF: An Energy Efficient Procrastination Scheduler for Multi-Core Mixed Criticality Systems
Louella Colaco; Amol Pai; Biju K Raveendran; Sasikumar Punnekkat

4. Efficient Welfare Maximization in Fog-Edge Computing Environment
Avadhesh Sharma; Aryabartta Sahu; Chinmaya Kumar Swain

5. Machine Learning Based Thread Pool Tuning via Program Analysis
Lakindu Akash; Duneesha Fernando; Malith Jayasinghe; Chamath Keppitiyagama; Kishanthan Thangarajah

6. Transparency-Privacy Trade-off in Blockchain-Based Supply Chain in Industrial Internet of Things
Muhammad Islam; Mubashir Husain Rehmani; Jinjun Chen
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Pitaya Poompuang, Rajamangala University of Technology Thanyaburi, Thailand

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Blockchain:
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