

# IEEE HPCC/SmartCity/DSS/DependSys-2020

*The 22nd IEEE International Conference on High Performance Computing and Communications (HPCC 2020)*

*The 18th IEEE International Conference on Smart City (SmartCity 2020)*

*The 6th IEEE International Conference on Data Science and Systems (DSS 2020)*

*The 6th IEEE International Conference on Dependability in Sensor, Cloud and Big Data Systems and Applications (DependSys 2020)*

December 14-16, 2020, Fiji

<http://www.ieee-hpcc.org/2020/>

Conference Program and Information Booklet



Organized by

St. Francis Xavier University and University of Fiji



Sponsored by

IEEE, IEEE Computer Society, IEEE Technical Committee on Scalable Computing



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# Presentation Guidelines

## Conference Date

The conference is to be held from Dec 14-16, 2020. The time for conference program is based on CST, China Standard Time.

## Language

The presentation language of the IEEE HPCC/SmartCity/DSS&/DependSys-2020 and associated workshops is English.

## For Session Chairs

Session Chairs are requested to join the zoom at least 10 minutes before their session.

## For Authors

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

## Timing

Please ensure you 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-2020 presentations use **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:

Pending

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

# Online Conference Venue

The congress will be held online via five zooms. A zoom is used for keynote. Other four zooms correspond to the four rooms, respectively, in the program. In addition to daily keynote, you can enter any room that you are interested in via the links:

Keynote: <https://zoom.us/j/9930718801?pwd=SWQwd0JYV1JEWGs3RGozVW8vRHc5QT09>

Room 1: <https://zoom.us/j/6963792610?pwd=MjFHQjQ3QlVaTTRwUDVSQzIeFeFdidz09>

Room 2: <https://zoom.us/j/3780486301?pwd=bFpDdWhxRmN4M3F4MW96cHNENU93QT09>

Room 3: <https://zoom.us/j/3441242091?pwd=eGdteTVYTDErTFZjeTRKeW9nOFIVZz09>

Room 4: <https://zoom.us/j/7498225579?pwd=Uk1DYWNJSmhJVnBaVlhYMGtTNE9VQT09>

**It is strongly recommended to join the Keynote or your interested room via the web-based zoom (see the instruction below), especially for those who have not a zoom account yet or cannot use the zoom app for free.**

After typing a link into your browser, click "Join from Your Browser" on your webpage and you will be joining the conference for free. In the event that the meeting passcode is required, please type **616616** for all above rooms.

During each presentation, you can type your question(s) in the zoom. After the presentation, the session chair will ask the question for you. Beyond the online congress, you can replay any presentation by clicking the link in the program after adding the following four workspaces. **Just notice that please don't upload any files into slack, which will squeeze out the presentations.**

Workspace 1:

[https://join.slack.com/t/workspace1-a8x7119/shared\\_invite/zt-jtd58ngj-bNYr9MgJmPmbYvrsN2o2~g](https://join.slack.com/t/workspace1-a8x7119/shared_invite/zt-jtd58ngj-bNYr9MgJmPmbYvrsN2o2~g)

Workspace 2:

[https://join.slack.com/t/teamworkspace2/shared\\_invite/zt-jve70xmr-XulKIJcb7RTE1t1K4aHaOQ](https://join.slack.com/t/teamworkspace2/shared_invite/zt-jve70xmr-XulKIJcb7RTE1t1K4aHaOQ)

For any assistance, please contact [ieee-hpcc-smartcity-dss-dependsys-2020@googlegroups.com](mailto:ieee-hpcc-smartcity-dss-dependsys-2020@googlegroups.com)

**IEEE HPCC/SmartCity/DSS/DependSys-2020**  
**Program-at-Glance Overview**

## Monday December 14, 2020 (China Standard Time CST, UTC+8)

09:00-09:30	Opening and Award Ceremony			
09:30-10:15	<b>Keynote 1:</b> Quantum Computing: Pathway for the next decade <b>S. S. Iyengar</b> , Florida International University, USA <b>Chaired by</b> Sudip Misra, Indian Institute of Technology Kharagpur, India			
10:15-10:30	Break			
Room	Room 1	Room 2	Room 3	Room 4
10:30-12:10	HPCC-1 High Performance Computing and Applications (I)	HPCC-2 High Performance Computing and Applications (II)	HPCC-3 High Performance Computing and Applications (V)	HPCC-4 High Performance Computing and Applications (VI)
12:10-13:10	Break			
13:10-14:50	HPCC-5 High Performance Computing and Applications (III)	HPCC-6 High Performance Computing and Applications (IV)	SmartCity-1 Enabling Technologies for Smart City	SmartCity-2 Big City Data and Mining (I)
14:50-15:00	Break			
15:00-15:45	<b>Keynote 2:</b> The Future HPC will be open <b>Mateo Valero</b> , Technical University of Catalonia, Spain <b>Chaired by</b> Beniamino Di Martino, Second University of Naples, Italy			
15:45-16:00	Break			
16:00-17:40	HPCC-7 Parallel and Distributed Computing and Systems (II)	HPCC-8 Parallel and Distributed Computing and Systems (III)	HPCC-9 Parallel and Distributed Computing and Systems (IV)	SmartCity-3 Smart City Services
17:40-17:50	Break			
17:50-19:30	HPCC-10 Communications and Networking (I)	HPCC-11 Communications and Networking (V)	HPCC-12 (Short Paper) Parallel and Distributed Computing and Systems (III)	HPCC-13 (Short Paper) Dependable and Efficient Intelligent CPS

## Tuesday December 15, 2020 (China Standard Time CST, UTC+8)

08:00-08:45	<b>Keynote 3:</b> Towards Smart and Secure Wireless Health <b>Honggang Wang</b> , UMass Dartmouth, USA <b>Chaired by</b> Jinjun Chen, Swinburne University of Technology, Australia			
08:45-09:30	<b>Keynote 4:</b> Sentience-Efficient Edge Computing for City-Scale IoT Deployments <b>Sumi Helal</b> , University of Florida, USA <b>Chaired by</b> Hai Jiang, Arkansas State University, USA			
09:30-09:40	<b>Break</b>			
Room	Room 1	Room 2	Room 3	Room 4
09:40-12:10	DependSys-1 (Short Paper) Security Fundamentals and Technologies	DependSys-2 Security Fundamentals and Technologies (I)	DependSys-3 Dependable and Secure Systems	DSS-1 Data Processing Technology
	Dependable and Secure Systems	Security Fundamentals and Technologies (II)	Dependability and Security Measures and Assessments	Data Systems
12:10-13:10	<b>Break</b>			
13:10-14:50	HPCC-14 Parallel and Distributed Computing and Systems (I)	HPCC-15 Communications and Networking (II)	HPCC-16 Communications and Networking (III)	DSS-2 Data Science
14:50-15:00	<b>Break</b>			
15:00-16:40	HPCC-17 Communications and Networking (IV)	HPCC-18 (Short Paper) High Performance Computing and Applications (I)	HPCC-19 (Short Paper) High Performance Computing and Applications (II)	DSS-3 Data Applications
16:40-16:50	<b>Break</b>			
16:50-18:30	HPCC-20 (Short Paper) High Performance Computing and Applications (III)	HPCC-21 (Short Paper) Parallel and Distributed Computing and Systems (V)	HPCC-22 (Short Paper) Parallel and Distributed Computing and Systems (VI)	DSS-4 (Short Paper) Data Science and Systems
18:30-18:40	<b>Break</b>			
18:40-19:55	HPCC-23 (Short Paper) Parallel and Distributed Computing and Systems (IV)	HPCC-24 (Short Paper) Communications and Networking (I)	HPCC-25 (Short Paper) Communications and Networking (VI)	HPCC-26 (Short Paper) Communications and Networking (VII)

## Wednesday December 16, 2020 (China Standard Time CST, UTC+8)

08:30-09:15	<b>Keynote 5:</b> Big Data Systems and HPC <b>Geoffrey Charles Fox</b> , Indiana University, USA. <b>Chaired by</b> Zizhong Chen, University of California at Riverside, USA			
09:15-10:00	<b>Keynote 6:</b> Large Graph Processing on Heterogeneous Architectures: Systems, Applications and Beyond <b>Bingsheng He</b> , National University of Singapore, Singapore <b>Chaired by</b> Xiaowen Chu, Hong Kong Baptist University, Hong Kong			
10:00-10:10	<b>Break</b>			
Room	Room 1	Room 2	Room 3	Room 4
10:10-12:15	HPCC-27 (Short Paper) Parallel and Distributed Computing and Systems (I)	HPCC-28 (Short Paper) Parallel and Distributed Computing and Systems (II)	HPCC-29 (Short Paper) Communications and Networking (II)	SmartCity-4 Big City Data and Mining (II)
12:15-13:10	<b>Break</b>			
13:10-14:50	HPCC-30 (Short Paper) Communications and Networking (III)	HPCC-31 (Short Paper) Communications and Networking (IV)	HPCC-32 (Short Paper) Communications and Networking (V)	HPCC-33 (Short Paper) Communications and Networking (VIII)
14:50-15:00	<b>Break</b>			
15:00-16:40	HPCC-34 (Short Paper) Communications and Networking (IX)	HPCC-35 (Short Paper) Communications and Networking (X)	HPCC-36 (Short Paper) High-Performance Mobile Edge Computing (I)	HPCC-37 (Short Paper) High-Performance Mobile Edge Computing (II)
16:40-16:50	<b>Break</b>			
16:50-18:30	SmartCity-5 Smart City Systems (I)	SmartCity-6 Smart City Systems (II)		

## Welcome Message from the Congress Chairs

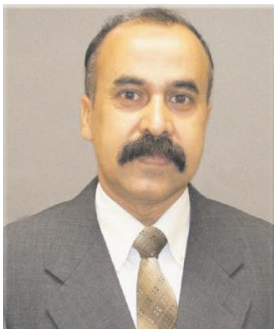
Welcome to the IEEE 22nd International Conference on High Performance Computing and Communications; IEEE 18th International Conference on Smart City; IEEE 6th International Conference on Data Science and Systems and 6th IEEE International Conference on Dependability in Sensor, Cloud and Big Data Systems and Applications (HPCC/SmartCity/ DSS/DependSys-2020)!

The HPCC/SmartCity/DSS/DependSys-2020 has moved into the mainstream of computing and determined future research and development activities in many academic and industrial branches, especially when the solution of large and complex problems must cope with very tight timing schedules. The HPCC/SmartCity/DSS/DependSys-2020 conferences provide a high-profile, leading-edge forum for researchers, engineers, and practitioners to present state-of-art advances and innovations in theoretical foundations, systems, infrastructure, tools, testbeds, and applications for high performance computing and communications, smart city, data science and systems, dependability in sensors, cloud and big data systems and applications, as well as to identify emerging research topics and define the future.

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, and IEEE Technical Committee on Scalable Computing (TCSC). 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 Fiji, December 14-16, 2020. Given the COVID-19 pandemic and associated travel restrictions, as the safety of people is of the highest priority, the conferences were held virtually on December 14-16, 2020 accordingly.

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



A B M Shawkat Ali, Professor  
IEEE Senior Member  
Dean of the School of Science and  
Technology, University of Fiji, Fiji  
Conference General Chair



Laurence T. Yang, Professor, FCAE, FEIC, FIEEE  
Chair, IEEE CS TC on Scalable Computing  
Chair, IEEE SMC TC on Cybermatics  
St Francis Xavier University, Canada  
Conference Steering Chair



## Congress Keynotes

**Keynote: S. S. Iyengar**, Florida International University, USA

Quantum Computing: Pathway for the next decade

**Keynote: Mateo Valero**, Technical University of Catalonia, Spain

The Future HPC will be open

**Keynote: Honggang Wang**, UMass Dartmouth, USA

Towards Smart and Secure Wireless Health

**Keynote: Sumi Helal**, University of Florida, USA

Sentience-Efficient Edge Computing for City-Scale IoT Deployments

**Keynote: Geoffrey Charles Fox**, Indiana University, USA

Big Data Systems and HPC

**Keynote: Bingsheng He**, National University of Singapore, Singapore

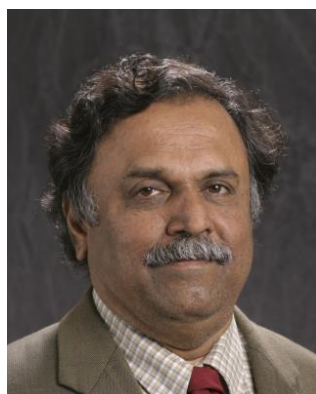
Large Graph Processing on Heterogeneous Architectures: Systems, Applications and Beyond

# IEEE HPCC/SmartCity/DSS/DependSys-2020

## Keynote: *Quantum Computing: Pathway for the next decade*

*S. S. Iyengar, Florida International University, USA*

## About the Keynote Speaker



S. S. Iyengar is a Distinguished University Professor at Florida International University, Miami. Dr. Iyengar is a pioneer in the field of distributed sensor networks/sensor fusion, computational aspects of robotics and high-performance computing. He has published over 600 research papers and has authored/edited 22 books published by MIT Press, John Wiley & Sons, Prentice Hall, CRC Press, Springer Verlag, etc. These publications have been used in major universities all over the world. He has many patents and some patents are featured in the World's Best Technology Forum in Dallas, Texas. His research publications are on the design and analysis of efficient algorithms, parallel computing, sensor networks, and robotics. During the last four decades, he has supervised over 65 Ph.D. students, 100 Master's students, and many undergraduate students who are now faculty at Major Universities worldwide or Scientists or Engineers at National Labs/Industries around the world. He has also had many undergraduate students working on his research projects. Recently, Dr. Iyengar received the Test of Time Award for his seminal work in Brooks-Iyengar Algorithm.

Dr. Iyengar is a member of the European Academy of Sciences, a Fellow of IEEE, a Fellow of ACM, a Fellow of AAAS, a Fellow of the National Academy of Inventors NAI and a Fellow of Society of Design and Process Program (SPDS), Fellow of Institution of Engineers (FIE), a Fellow of the American Institute for Medical and Biological Engineering (AIMBE), was awarded a Distinguished Alumnus Award of the Indian Institute of Science, Bangalore, and the IEEE Computer Society Technical Achievement for the contributions to sensor fusion algorithms, and parallel algorithms. He also received the IBM Distinguished Faculty Award, NASA Fellowship Summer Awards at Oakridge National Lab and the Jet Propulsion Laboratory. He is a Village Fellow of the Academy of Transdisciplinary Learning and Advanced Studies in Austin, Texas, 2010.

He has received various national and international awards including the Times Network NRI (Non-Resident Indian) of the Year Award for 2017, the National Academy of Inventors Fellow Award in 2013, the NRI Mahatma Gandhi Pradvasi Medal at the House of Lords in London in 2013, a Lifetime Achievement Award conferred by International Society of Agile Manufacturing (ISAM) in recognition of his illustrious career in teaching, research and administration and a lifelong contribution to the fields of Engineering and Computer Science at Indian Institute of Technology (BHU). In 2012, Iyengar and Nulogix were awarded the 2012 Innovation-2-Industry (i2i) Florida Award. Iyengar received a Distinguished Research Award from Xiamen University, China for his research in Sensor Networks, Computer Vision and Image Processing. Iyengar's landmark contributions with his research group include the development of grid coverage for surveillance and target location in distributed sensor networks and the Brooks Iyengar fusion algorithm. He has also been awarded Honorary and Doctor of Science and Engineering Degree. He serves on the advisory board of many corporations and universities around the world. He has served on many National Science Boards such as NIH - National Library of Medicine in Bioinformatics, National Science Foundation review panel, NASA Space Science, Department of Homeland Security, Office of Naval Security, and many others. His contribution to the US Naval Research Laboratory was a centerpiece of a pioneering effort to develop image analysis for science and technology and to expand the goals of the US Naval Research Laboratory.

The impact of his research contributions can be seen in companies and National Labs like Raytheon, Telecordia, Motorola, the United States Navy, DARPA, and other US agencies. His contribution in DARPAS's program demonstration with BBN, Cambridge, Massachusetts, MURI, researchers from PSU/ARL, Duke, University of Wisconsin, UCLA, Cornell university and LSU has been significant.

He is also the founding Editor of the International Journal of Distributed Sensor Networks. He has been on the editorial board of many journals and is also a PhD Committee Member at various universities, including CMU, Duke University, and many others throughout the world. He is presently the Editor of ACM Computing Surveys and other journals. He is also the founding director of the FIU's Discovery Laboratory. His research work has been cited extensively. His fundamental work has been transitioned into unique technologies. All through his four-decade long professional career, Dr. Iyengar has devoted and employed mathematical morphology in a unique way for quantitative understanding of computational processes for many applications.

**Summary:** Quantum computing has come a long way since it was first perceived. Quantum machines have shown potential to revolutionize the design of models pertaining to cryptography, artificial intelligence, machine learning etc. impacting fields like logistics, manufacturing, finance and energy to name a few. Quantum computing will also have a great influence on the way in which our information will be processed and communicated in similar lines to how quantum physics has impacted over the past decade or so. There are many technical hurdles that has delayed the large-scale adoption of quantum computing some of which include the need for manipulations to be made at nanoscale, special operating environment involving vacuum at cryogenic temperatures etc. However, research conducted over the past decade has given this field significance and the required impetus to be adopted for large scale activities. The use of quantum computers also requires a good understanding of how it differs from the classical computers. Most importantly, quantum computing is not built on bits that take discrete values of zero or one, but on qubits that can be overlays of zeros and ones (i.e., part zero and part one at the same time instant) and qubits do not exist in isolation but become entangled and act as a group. The above-mentioned properties enable qubits to achieve an exponentially higher information density than classical computers. Quantum Computing and FIU is highly coupled for the last 5 years with outstanding results. The below listed are the contributions and ongoing work in Quantum Computing (QC) at the qubitrest lab, FIU, Florida. Our recent work has been on the following diverse topics: Bidirectional teleportation for underwater quantum communications; Satellite quantum repeaters for a quantum Internet; Satellite quantum communication regardless of the weather; Analysis of five techniques for the internal representation of a digital image inside a quantum processor; Virtual key redistribution in a quantum data security context; Efficient redistribution of keys in a quantum key distribution (QKD) system and others. These topics will pave ways for future investigation and understanding of the field of Quantum computing and bootstrap the adoption of the same in our day to day life. In this talk, we will focus on some of these topics along with the opportunities and requirements for the next decade.

# IEEE HPCC/SmartCity/DSS/DependSys-2020

## Keynote: *The Future HPC will be open*

*Mateo Valero, Technical University of Catalonia, Spain*

### About the Keynote Speaker



Mateo Valero, <http://www.bsc.es/cv-mateo/>, obtained his Telecommunication Engineering Degree from the Technical University of Madrid (UPM) in 1974 and his Ph.D. in Telecommunications from the Technical University of Catalonia (UPC) in 1980. He is a professor in the Computer Architecture Department at UPC, in Barcelona. His research interests focus on high performance architectures. He has published approximately 700 papers, has served in the organization of more than 300 International Conferences and he has given more than 500 invited talks. He is the director of the Barcelona Supercomputing Centre, the National Centre of Supercomputing in Spain.

Dr. Valero has been honoured with several awards. Among them, the Eckert-Mauchly Award 2007 by the IEEE and ACM; Seymour Cray Award 2015 by IEEE; Charles Babbage 2017 by IEEE; Harry Goode Award 2009 by IEEE; ACM Distinguished Service Award 2012; Euro-Par Achievement Award 2015; the Spanish National Julio Rey Pastor award, in recognition of research in Mathematics; the Spanish National Award "Leonardo Torres Quevedo" that recognizes research in engineering; the "King Jaime I" in basic research given by Generalitat Valenciana; the Research Award by the Catalan Foundation for Research and Innovation and the "Aragón Award" 2008 given by the Government of Aragón. He has been named Honorary Doctor by the Universities of Chalmers, Belgrade, Las Palmas de Gran Canaria, Zaragoza, Complutense de Madrid, Cantabria, Granada and the University of Veracruz and CINVESTAV in Mexico. "Hall of the Fame" member of the ICT European Program (selected as one of the 25 most influents European researchers in IT during the period 1983-2008. Lyon, November 2008); Honoured with Creu de Sant Jordi 2016 by Generalitat de Catalunya. It is the highest recognition granted by the Government. Honoured with "Condecoración de la Orden Mexicana del Águila Azteca" 2018, highest recognition granted by the Mexican Government. In 2020, Mateo has been recognized with the Outstanding Leadership in HPC award in the HPCWire Readers' Choice Awards for "being an HPC pioneer since 1990 and the driving force behind the renaissance of European HPC independence".

**Summary:** The combination of technology trends and exponential growth of data and compute have ushered in an era of software/hardware co-design to meet the major KPIs for the system. Open hardware is required to participate in this new era and open ISAs like RISC-V enable this capability. Open ISAs provide a final ingredient to produce an open ecosystem for HPC, from software all the way down to the chips. With the momentum behind RISC-V, we believe this ecosystem will dominate this open stack and we are using HPC as the pathfinder to define this new open world. BSC is leading RISC-V projects across two major thrusts that reflect the major compute components in an HPC system: Accelerators and CPUs. BSC is leading EPI Stream 3, a collection of RISC-V accelerators, including a vector accelerator based on the new RISC-V vector extension. This design will evolve into 2 accelerator chiplets (vector accelerator and ML/Stencil accelerator) sharing a common I/O and memory subsystem in EPI Pilot2 (submitted proposal). This pilot will produce chiplets that are coherent, scalable and independent, with only European IP, targeting a small geometry European fab. In addition, BSC is building infrastructure to support future accelerator and CPU designs with the large-scale FPGA emulation testbed call MEEP. We see an integrated future of chiplets and HBM memory. We can leverage the HBM memory in the FPGA as well as other hard macros to emulate these systems, at scale. This testbed is also defining the generation of vector accelerators beyond EPI as an example of the capabilities of MEEP as an Software Development Vehicle and pre-silicon validation platform. The BSC is leading several CPU projects to build up the expertise and know-how for the full CPU design cycle, from specification, to chip fabrication, the other pillar of general-purpose processing. Finally, we are targeting a high performance 2-way out-of-order processor design with on- and off-chip coherence in the eProcessor project. These projects not only focus on the hardware design, but also the entire software stack to enable the entire open HPC ecosystem.

# IEEE HPCC/SmartCity/DSS/DependSys-2020

## **Keynote: Towards Smart and Secure Wireless Health**

*Honggang Wang, UMass Dartmouth, USA*

### About the Keynote Speaker



Honggang Wang is a professor of Electrical and Computer Engineering at UMass Dartmouth. He received the "Scholar of The Year" award (only one per year) in 2016 from UMass Dartmouth. His research interests include Internet of Things (IoT), Wireless Health, Body Area Networks (BAN), Cyber and Multimedia Security, Mobile Multimedia and Cloud, Wireless Networks and Cyber-physical System, and BIG DATA in mHealth. He has published more than 200 papers in his research areas. He was an invited participant by National Academic Engineering (NAE) for 2017 German-American Frontiers of Engineering Symposium, as one of about 50 outstanding young engineers from US companies, universities, and government labs. He serves as the steering committee Co-chair of IEEE conference on Connected Health (CHASE) and TPC co-chair of IEEE CHASE 2016, which is a leading international conference in the field of connected health. He has also been serving as the Editor in Chief (EIC) for IEEE Internet of Things journal since 2020, and Associate Editors for IEEE Transactions on Big Data and IEEE Transactions on Circuits and Systems for Video Technology. He was the past Chair

(2018-2020) of IEEE Multimedia Communications Technical Committee and is the Chair of IEEE eHealth Committee (2020-2021). He is an IEEE Distinguished Lecturer (ComSoc, 2019-2020) and an IEEE Fellow (class 2021).

### **Summary:**

Wireless health is the use of Internet, sensing, wireless communications and intelligent techniques in support of healthcare applications. Wireless body area networks (WBANs) with various types of biomedical sensors is one of major infrastructures of connected health and provide an opportunity to address issues in rapidly increasing wireless health applications. However, there are significant challenges in the area, such as improving the performance of WBANs, analytics of large and continuous physiological data collected from biomedical sensors and predictive modeling, and securing data transmission and protecting data privacy, especially in mobile and wireless environments. In this talk, I will introduce two case studies in the related area: (1) developing a wearable biosensor system for the remote detection of life-threatening events in infants; (2) a security system to support reliable and secured data transmissions over WBANs.

# IEEE HPCC/SmartCity/DSS/DependSys-2020

**Keynote: *Sentience-Efficient Edge Computing for City-Scale IoT Deployments***

*Sumi Helal, University of Florida, USA*

## About the Keynote Speaker



Sumi Helal is a Professor in the Computer & Information Science and Engineering Department at the University of Florida, USA, and Director of its Mobile and Pervasive Computing Laboratory. He co-founded and directed the Gator Tech Smart House, a real-world deployment project that aimed at identifying key barriers and opportunities to make the Smart Home concept a common place (creating the "Smart Home in a Box" concept). His active areas of research focus on architectural and programmability aspects of the Internet of Things, and on pervasive/ubiquitous systems and their human-centric applications with special focus on smart spaces, proactive health/wellness, patient empowerment and e-coaching, and assistive technology in support of personal health, aging, disabilities, and independence. Professor Helal served as the Editor-in-Chief of IEEE

Computer (2015-2018), the Computer Society's flagship and premier publication. Professor Helal is a Boilermaker (Ph.D., Purdue University, class of 1991), Fellow of the IEEE, Fellow of the IET, Fellow of the AAAS, and a member of Academia Europaea. He is also the 2020 IEEE Computer Society President-Elect nominee. Contact him at [sumi.helal@ieee.org](mailto:sumi.helal@ieee.org).

**Summary:** Recent advances in IoT and pervasive and ubiquitous computing provide a glimpse into the future of our planet and reveal exciting visions of smart many things: smart cities, smart homes, smart cars, in addition to smart spaces such as malls, workplaces, hotels, schools, and much more. Driven by a technological revolution offering "low-power many things and wireless almost everything", we could, in only a decade, envision and prototype impressive smart space systems that improve quality of life, enhance awareness of resources and the environment, and enrich users' experience. But prototyping is one thing; actual large-scale deployments are another. The massive scale of sensors and IoT devices that will be deployed in highly populated smart cities of the future will be mind-bugling. Without a carefully-thought ecosystem and a scalable architecture in place, it will be extremely difficult to manage or program such an expanding and massive IoT. In this talk, I will start by raising the thought of how can we estimate the Value of the IoT as we once estimated the value of the network. I will then introduce our recent work - the Cloud-Edge-Beneath (CEB) architecture and present its salient scalability features. I will also present CEB's bi-directional waterfall optimization framework and show how it leads to "sentience-efficiency" – a new paradigm for realizing aggressive energy-efficiency. I will then present an event-driven programming model based on CEB and show how the model and CEB, combined, foster a much-needed IoT programmability ecosystem. Finally, I will present a validation study demonstrating CEB's scaling behavior in face of IoT expansions (sensors and applications) and under dynamically increasing loads.

# IEEE HPCC/SmartCity/DSS/DependSys-2020

## **Keynote: Big Data Systems and HPC**

*Geoffrey Charles Fox, Indiana University, USA*

## About the Keynote Speaker



Fox received a Ph.D. in Theoretical Physics from Cambridge University, where he was Senior Wrangler. He is now a distinguished professor of Engineering, Computing, and Physics at Indiana University, where he is the director of the Digital Science Center. He previously held positions at Caltech, Syracuse University, and Florida State University after being a postdoc at the Institute for Advanced Study at Princeton, Lawrence Berkeley Laboratory, and Peterhouse College Cambridge. He has supervised the Ph.D. of 73 students and published around 1500 papers (550 with at least ten citations) in physics and computing with a hindex of 83 and over 39000 citations. He received the High-Performance Parallel and Distributed Computing (HPDC) Achievement Award and the ACM - IEEE CS Ken Kennedy Award for Foundational contributions to parallel computing in 2019. He is a Fellow of APS (Physics) and ACM (Computing) and works

on the interdisciplinary interface between computing and applications. He is involved in several projects to enhance the capabilities of Minority Serving Institutions. He has experience in online education and its use in MOOCs for areas like Data and Computational Science. He is active in the Industry consortium MLPerf. Contact him at [gcf@indiana.edu](mailto:gcf@indiana.edu). More details can be found at <http://www.dsc.soic.indiana.edu/>.

## Summary:

We discuss Big Data Systems noting different requirements for data science with compute-intensive execution of deep/machine learning and data engineering with many pre-processing, post-processing, and data management tasks. High performance computing HPC will be critical especially in the data science component. We need to integrate the Java (data engineering) C++ (deep learning) and Python ecosystems.

This architecture suggests a cloud of modest-sized AI-accelerated systems in a sea of commodity servers. We discuss how Twister2 and Cylon linked to a wealth of other capabilities help to address this.

Deep Learning (DL) is rapidly replacing other AI (ML) and we give 3 examples i) MDS Multidimensional scaling for dimension reduction ii) Surrogates for simulations and data analytics; iii) Spatial time series where we give application examples from COVID-19 daily data, solutions of ordinary differential equations, and other fields of science generating geospatial time series.

Most computing could be done on the HPC hybrid clouds described in the first paragraph with the largest scale simulations performed on (exascale) supercomputers deriving the surrogates that allow many simulations to be performed on smaller machines. Recently 2 Gordon Bell and the CASP awards went to molecular science simulations enhanced by deep learning surrogates which highlights new modes of science discovery. We review the core AI issues needed to advance the study of surrogates including neural and hyperparameter search, mapping of patterns to meta-surrogates, uncertainty quantification, and minimization of training set size.

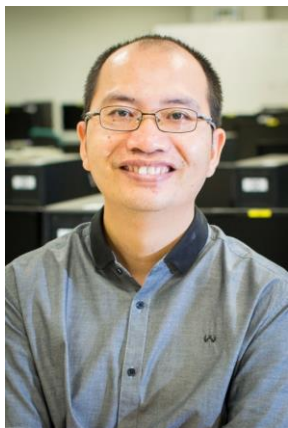


# IEEE HPCC/SmartCity/DSS/DependSys-2020

## **Keynote: Large Graph Processing on Heterogeneous Architectures: Systems, Applications and Beyond**

*Bingsheng He, National University of Singapore, Singapore*

### About the Keynote Speaker



Dr. Bingsheng He is currently an Associate Professor and Vice-Dean (Research) at School of Computing, National University of Singapore. Before that, he was a faculty member in Nanyang Technological University, Singapore (2010-2016), and held a research position in the System Research group of Microsoft Research Asia (2008-2010), where his major research was building high performance cloud computing systems for Microsoft. He got the bachelor's degree in Shanghai Jiao Tong University (1999-2003), and the Ph.D. degree in Hong Kong University of Science & Technology (2003-2008). His current research interests include cloud computing, database systems and high-performance computing. His papers are published in prestigious international journals (such as ACM TODS and IEEE TKDE/TPDS/TC) and proceedings (such as ACM SIGMOD, VLDB/PVLDB, ACM/IEEE SuperComputing, ACM HPDC, and ACM SoCC). He has been awarded with the IBM Ph.D. fellowship (2007-2008) and with NVIDIA Academic Partnership (2010-2011). Since 2010, he has (co-)chaired a number of international conferences and workshops, including IEEE CloudCom 2014/2015, BigData Congress 2018 and ICDCS 2020. He has served in editor board of international journals, including IEEE Transactions on Cloud Computing (IEEE

TCC), IEEE Transactions on Parallel and Distributed Systems (IEEE TPDS), IEEE Transactions on Knowledge and Data Engineering (TKDE), Springer Journal of Distributed and Parallel Databases (DAPD) and ACM Computing Surveys (CSUR). He has got editorial excellence awards for his service in IEEE TCC and IEEE TPDS in 2019.

### **Summary:**

Graphs are de facto data structures for many data processing applications, and their volume is ever growing. Many graph processing tasks are computation intensive and/or memory intensive. Therefore, we have witnessed a significant amount of effort in accelerating graph processing tasks with heterogeneous architectures like GPUs, FPGAs and even ASIC. In this talk, we will first review the literatures of large graph processing systems on heterogeneous architectures. Next, we present our research efforts, and demonstrate the significant performance impact of hardware-software co-design on designing high performance graph computation systems and applications. Finally, we outline the research agenda on challenges and opportunities in the system and application development of future graph processing.



# The HPCC 2020 Technical Program

## Monday December 14, 2020

09:00-09:30	Opening and Award Ceremony			
09:30-10:15	Keynote 1: S. S. Iyengar, Florida International University, USA			
10:15-10:30	Break			
10:30-12:10	HPCC-1 (Room1)	HPCC-2 (Room2)	HPCC-3 (Room3)	HPCC-4 (Room4)
12:10-13:10	Break			
13:10-14:50	HPCC-5 (Room1)	HPCC-6 (Room2)		
14:50-15:00	Break			
15:00-15:45	Keynote 2: Mateo Valero, Technical University of Catalonia, Spain			
15:45-16:00				
16:00-17:40	HPCC-7 (Room1)	HPCC-8 (Room2)	HPCC-9 (Room3)	
17:40-17:50	Break			
17:50-19:30	HPCC-10 (Room1)	HPCC-11 (Room2)	HPCC-12 (Room3)	HPCC-13 (Room4)

### HPCC-1: High Performance Computing and Applications (I)

Session Chair: Dakai Zhu, University of Texas at San Antonio, USA

1. [DiHi: Distributed and Hierarchical Performance Modeling of Multi-VM Cloud Running Applications](#)

Hamidreza Moradi; Wei Wang; Dakai Zhu

2. [Analyzing the Performance of Smart Industry 4.0 Applications on Cloud Computing Systems](#)

Razin Hussain; Alireza Pakravan; Mohsen Salehi

3. [Descriptive and Predictive Analysis of Aggregating Functions in Serverless Clouds: The Case of Video Streaming](#)

Shangrui Wu; Chavit Denninnart; Xiangbo Li; Yang Wang; Mohsen Amini Salehi

4. [Energy Efficiency Evaluation Based on QoS Parameter Specification for Cloud Systems](#)

Saiqin Long; Hao Yu; Zhetao Li; Shujuan Tian; Yun Li

### HPCC-2: High Performance Computing and Applications (II)

Session Chair: Changqing Luo, Virginia Commonwealth University, USA

1. [Load-Aware Adaptive Cache Management Scheme for Enterprise-Level Stackable Cryptographic FileSystem](#)

Chunhua Xiao; Yanyue Pan; Dandan Xu; Weichen Liu; Shuting Sun; Shi Qiu

2. [Structure Preserved Graph Reordering for Fast Graph Processing Without the Pain](#)

Baofu Huang; Zhidan Liu; Kaishun Wu

3. [SwarmGraph: Analyzing Large-Scale In-Memory Graphs on GPUs](#)

Yuede Ji; Hang Liu; H. Howie Huang

4. [Improving System Utilization on Wireless HPC Systems with Torus Interconnects](#)

Kangkang Li; Yitao Qiu; Congfeng Jiang; Maciej Malawski; Jaroslaw (Jarek) Nabrzyski

### **HPCC-3: High Performance Computing and Applications (V)**

**Session Chair: Saide Zhu, Georgia State University, USA**

1. [Improving Parallel Performance of Ensemble Learners for Streaming Data Through Data Locality with Mini-Batching](#)

*Guilherme W Cassales; Heitor Gomes; Albert Bifet; Bernhard Pfahringer; Hermes Senger*

2. [Batched Pattern-Aware Cache Management Strategy for Astronomical Time Series Sub-Images Retrieval](#)

*Qinlong Kang; Ce Yu; Chao Sun; Jie Wang; Xiaoteng Hu*

3. [An Application-Driven Approach to Mitigate Aging by Tuning the TLP and Allocation Strategies](#)

*Thiaries Medeiros; Janaína Schwarzrock; Antoni Navarro; Marcelo Caggiani Luizelli; Fábio Diniz Rossi; Antonio Carlos Beck; Arthur Francisco Lorenzon*

4. [Design of Converged Network Coding Layer for the Ethernet and HPC High-Speed Network](#)

*Chao Wang; Weixia Xu; Lai Mingche; Jijun Cao*

### **HPCC-4: High Performance Computing and Applications (VI)**

**Session Chair: Cheng Zhang, West Texas A&M University, USA**

1. [Low-Cost MPI Multithreaded Message Matching Benchmarking](#)

*Whit Schonbein; Scott Levy; William Marts; Matthew Dosanjh; Ryan E Grant*

2. [Data Layout Transformation for Stencil Computations Using ARM NEON Extension](#)

*Kaifang Zhang; Huayou Su; Dou Yong*

3. [CLOCK-RWRF: A Read-Write-Relative-Frequency Page Replacement Algorithm for PCM and DRAM of Hybrid Memory](#)

*Huiyu Wang; Zhaoyan Shen; Mengying Zhao; Xiaojun Cai; Zhiping Jia*

4. [An Efficient Multi-GPU Implementation for Linear-Response Time-Dependent Density Functional Theory](#)

*Qingcai Jiang; Lingyun Wan; Shizhe Jiao; Wei Hu; Junshi Chen; Hong An*

### **HPCC-5: High Performance Computing and Applications (III)**

**Session Chair: Dongdong Huo, IIE, Chinese Academy of Sciences, China**

1. [The Fine Grained Collaborative NVM File System](#)

*Tao Cai; Jiancong Shi; Dejjiao Niu; Jie Wang; Fei Wang; Lei Li*

2. [LAPE: A Lightweight Attestation of Program Execution Scheme for Bare-Metal Systems](#)

*Dongdong Huo; Yu Wang; Chao Liu; Mingxuan Li; Yazhe Wang; Zhen Xu*

3. [ResNet Based Parallel Intelligent System Design for Marine Search and Rescue](#)

*Zhendong Su; Darong Liu; Lin Mu*

4. [CF-RDF: A Lightweight and Efficient Large-Scale RDF Data Management System](#)

*Xiaozhe Li; Renhai Chen; Guohua Yan; Zhiyong Feng*

### **HPCC-6: High Performance Computing and Applications (IV)**

**Session Chair: Guoqi Xie, Hunan University, China**

1. [Optimizing Astrophysical Simulation Software on Sunway Heterogeneous Manycore Architecture](#)

*Tao Fang*

2. [Optimization and Performance Modeling of Stencil Computations on ARM Architectures](#)

*Kaifang Zhang; Huayou Su; Dou Yong*

3. [PRArch: Pattern-Based Reconfigurable Architecture for Deep Neural Network Acceleration](#)

Zhaoming Jiang; Zhuoran Song; Naifeng Jing; Xiaoyao Liang

4. [Improving Performance for Simulating Complex Fluids on Massively Parallel Computers by Component Loop-Unrolling and Communication Hiding](#)

Xiaowei Guo; Chao Li; Wei Li; Cao Yu; Yi Liu; Ran Zhao; Sen Zhang; Canqun Yang

#### **HPCC-7: Parallel and Distributed Computing and Systems (II)**

**Session Chair: Ke Yu, Swinburne University of Technology, Australia**

1. [Effective Exploration of Thread Throttling and Thread/Page Mapping on NUMA Systems](#)

Janaína Schwarzrock; Hiago Mayk G. de A. Rocha; Arthur Francisco Lorenzon; Antonio Carlos Beck

2. [ParallelNAS: A Parallel and Distributed System for Neural Architecture Search](#)

Xiaoyang Qu

3. [Resource Aware Task Clustering for Scientific Workflow Execution in High Performance Computing Environments](#)

Randika Praveen Jayasekara; Ayesha Weerasinghe; Kalana Wijethunga; Indika Perera; Anuradha Wickramarachchi

4. [An Improved DVFS Algorithm for Energy-Efficient Real-Time Task Scheduling](#)

Ke Yu; Yun Yang; Hongwang Xiao; Jinjun Chen

#### **HPCC-8: Parallel and Distributed Computing and Systems (III)**

**Session Chair: Zhuo Li, Beijing Information Science & Technology University, China**

1. [TRem: A Task Revocation Mechanism for GPUs](#)

Manos Pavlidakis; Stelios Mavridis; Nikolaos Chrysos; Angelos Bilas

2. [DCache: A Distributed Cache Mechanism for HDFS Based on RDMA](#)

Xiao Zhang; Binbin Liu; Zian Gou; Jia Shi; Xiaonan Zhao

3. [DRS+: Load Shedding Meets Resource Auto-Scaling in Distributed Stream Processing](#)

Kailin Tang; ZhiFeng Hao; Ruichu Cai; Tom Z. J. Fu; Yin Yang; Li Wang; Marianne Winslett; Zhenjie Zhang

4. [DSANA: A Distributed Machine Learning Acceleration Solution Based on Dynamic Scheduling and Network Acceleration](#)

Runhua Zhang; Guowei Shen; Liangyi Gong; Chun Guo

#### **HPCC-9: Parallel and Distributed Computing and Systems (IV)**

**Session Chair: Jing Yang, Huazhong University of Science and Technology, China**

1. [Ranked Communication Channel Confidence for Multi-Agent Reinforcement Learning](#)

Dongzi Wang; Mingyang Geng; Bo Ding; Dawei Feng

2. [Federated Learning Based Mobile Crowd Sensing with Unreliable User Data](#)

Yuhong Jiang; Rong Cong; Chang Shu; Anqi Yang; Zhiwei Zhao; Geyong Min

3. [HeterSupervise: Package-Level Android Malware Analysis Based on Heterogeneous Graph](#)

Jianguo Jiang; Zhaoce Liu; Gang Li; Min Yu; Song Li; Chao Liu; Weiqing Huang

4. [Profit-Driven Computation Offloading for Mobile Edge Computing in Wireless Metropolitan Area Networks](#)

Hualong Huang; Kai Peng; Xiaolong Xu

#### **HPCC-10: Communications and Networking (I)**

**Session Chair: Hao Dong, Institute of Information Engineering, Chinese Academy of Sciences, China**

1. [Isolation Guarantee for Efficient Virtualized Network I/O on Cloud Platform](#)

*Ye Yang; Haiyang Jiang; Yongzheng Liang; Yulei Wu; Yilong Lv; Xing Li; Gaogang Xie*

2. [Dynamically Controller Placement Among SDN Space-Terrestrial Integrated Networks](#)

*Xuhui Zhang; Feilong Tang; Long Chen; Ping Han; Yanqin Yang; Wenchao Xu*

3. [A Spatial-Temporal Features Based Fingerprinting Method for Machine Tools in DNC Networks](#)

*Zhongfeng Jin; Nan Li; Chao Liu; Meimei Li; Shaohua An; Weiqing Huang*

4. [On-Line Traffic Scheduling Optimization in IEEE 802.1Qch Based Time-Sensitive Networks](#)

*Wei Quan; Jinli Yan; Xuyan Jiang; Zhigang Sun*

**HPCC-11: Communications and Networking (V)**

**Session Chair: Feilong Tang, Shanghai Jiaotong University, China**

1. [Job-Aware Communication Scheduling for DML Training in Shared Cluster](#)

*Bin Chen; Yuan Yang; Mingwei Xu*

2. [Automated Honeynet Deployment Strategy for Active Defense in Container-Based Cloud](#)

*Tong Kong; Liming Wang; Duohe Ma; Zhen Xu; Qian Yang; Zhitong Lu; Yijun Lu*

3. [SeigeCannon: Detecting Malicious Infrastructures by Analyzing Integral Characteristics of Involved Server Flocks](#)

*Yixin Li; Xi Luo; Liming Wang; Jing Yang; Zhen Xu*

4. [Dynamic Processing While Transmitting for SDN-Based Space-Terrestrial Integrated Networks](#)

*Guangxiong Wu; Feilong Tang*

**HPCC-12: Parallel and Distributed Computing and Systems (III) (Short Paper)**

**Session Chair: Xu Zheng, University of Electronic Science and Technology of China, China**

1. [Mobile Real-Time Facial Expression Tracking with the Assistant of Public AI-As-a-Service](#)

*Xuncheng Liu; Jingyi Wang; Weizhan Zhang; Qinghua Zheng*

2. [MobileRE: A Hybrid Fault Tolerance Strategy Combining Erasure Codes and Replicas for Mobile](#)

*Yu Wu; Duo Liu; Xianzhang Chen; Jinting Ren; Renping Liu; Yujuan Tan; Zilin Zhang*

3. [An Efficient Task Offloading Strategy in Cloud-Edge Computing Under Deadline Constraints](#)

*Yu Liu; Xiaoting Wang; Jie Wan; Min Cheng; Yi Zhang*

4. [CCIED: Cache-Aided Collaborative Intelligence Between Edge Devices](#)

*Chuanwen Hu; Rui Wang; Chang Liu; Yuebin Bai; Xiaolin Wang*

**HPCC-13: Dependable and Efficient Intelligent CPS (Short Paper)**

**Session Chair: Junlong Zhou, Nanjing University of Science and Technology, China**

1. [Efficient Hyperparameters Optimization Through Model-Based Reinforcement Learning and Meta-Learning](#)

*Xiyuan Liu; Jia Wu; Senpeng Chen*

2. [Adversarial Point Cloud Perturbations to Attack Deep Object Detection Models](#)

*Mumuxin Cai; Nan Sang; Xupeng Wang; Jingyu Zhang*

3. [A Blockchain Based Fast Authentication Framework for IoT Networks with Trusted Hardware](#)

*Chanying Huang; Kedong Yan*

4. [Deletable Blockchain Based Secure EHR Storage Scheme in Multi-Cloud Environment](#)

*Rahul Mishra; Dharavath Ramesh; Damodar Reddy Edla*

# The HPCC 2020 Technical Program

## Tuesday December 15, 2020

08:00-08:45	Keynote 3: Honggang Wang, UMass Dartmouth, USA			
08:45-09:30	Keynote 4: Sumi Helal, University of Florida, USA			
09:30-09:40	Break			
09:40-12:10				
12:10-13:10	Break			
13:10-14:50	HPCC-14 (Room1)	HPCC-15 (Room2)	HPCC-16 (Room3)	
14:50-15:00	Break			
15:00-16:40	HPCC-17 (Room1)	HPCC-18 (Room2)	HPCC-19 (Room3)	
16:40-16:50	Break			
16:50-18:30	HPCC-20 (Room1)	HPCC-21 (Room2)	HPCC-22 (Room3)	
18:30-18:40	Break			
18:40-19:55	HPCC-23 (Room1)	HPCC-24 (Room2)	HPCC-25 (Room3)	HPCC-26 (Room4)

### HPCC-14: Parallel and Distributed Computing and Systems (I)

**Session Chair:** Ruonan Zhao, Huazhong University of Science and Technology, China

1. [Reinforcement Learning Based Heterogeneous Resource Provisioning for Cloud Web Applications](#)

*Yipei Fang; Zhicheng Cai*

2. [Age-Aware Query Evaluation for Big Data Analytics in Mobile Edge Clouds](#)

*Qiufen Xia; Wenhao Ren; Mingchu Li*

3. [A Reinforcement Learning-Based Virtual Machine Placement Strategy in Cloud Data Centers](#)

*Saiqin Long; Zhetao Li; Yun Xing; Shujuan Tian; Dongsheng Li; Rong Yu*

4. [Handling Large-Scale SAR Image Data on Network-Based Computer Systems Using Divisible Load Paradigm](#)

*Gokul Madathupalyam Chinnappan; Bharadwaj Veeravalli*

### HPCC-15: Communications and Networking (II)

**Session Chair:** Guoming Tang, Peng Cheng Laboratory, China

1. [Multi-Layer and Heterogeneous Controller Management Among Space-Terrestrial Integrated Networks](#)

*Peng Dong; Feilong Tang; Xuhui Zhang*

2. [AI-Aided Game: Enhancing the Defense Performance of Scale-Free Network via Deep Reinforcement Learning](#)

*Ziyue Lu; Guoming Tang; Baochao Chen; Bangbang Ren; Sheng Chen; Deke Guo*

3. [An Efficient Algorithm for Clarification of Rumors with Limited Costs in Social Networks](#)

*Xiaopeng Yao; Guangxian Liang; Hejiao Huang; Chonglin Gu*

4. [An Enhanced Data Plane for Network Event Processing in Software Defined Networking](#)

*Hao Dong; Wei Mi; Yulei Wu; Lei Zhang; Jiadi Chen; Yuepeng E*

**HPCC-16: Communications and Networking (III)**  
**Session Chair: Zhida Li, Simon Fraser University, Canada**

1. [Towards Aggregated Features: A Novel Proxy Detection Method Using NetFlow Data](#)  
*Peipei Fu; Qingya Yang; Chang Liu; Zhenzhen Li; Gaopeng Gou; Gang Xiong*
2. [Reducing Tail Latency in Proactive Congestion Control via Moderate Speculation](#)  
*Dezun Dong; Ke Wu*
3. [DCTCP with Front Marking: Decouple ECN Control Loop from the Queuing Delay](#)  
*Xu Ma; Yifei Lu; Zhengzhi Xu*
4. [Converging Credit-Based and Reactive Datacenter Transport Using ECN and RTT](#)  
*Hu Dinghuang*

**HPCC-17: Communications and Networking (IV)**  
**Session Chair: Hao Dong, IIE, Chinese Academy of Sciences, China**

1. [MTLH: Video QoE Monitoring for Encrypted Traffic via Multi-Task Learning with Hierarchy](#)  
*Lei Xu; Gang Xiong; Gaopeng Gou; Jie Chen; Tianyu Cui*
2. [Context-Aware Learning for Anomaly Detection with Imbalanced Log Data](#)  
*Peijie Sun; Yuepeng E; Tong Li; Yulei Wu; Jingguo Ge; Junling You; Bingzhen Wu*
3. [Freeway: An Order-Less User-Space Framework for Non-Real-Time Applications](#)  
*Yifan Shen; Ke Liu; Ziting Guo; Wenli Zhang; Guanghui Zhang; Mingyu Chen; Vaneet Aggarwal*
4. [How Many Users Behind A Local Recursive DNS Server? Estimated by Delta-Time Cluster Model](#)  
*Caiyun Huang; Yujia Zhu; Yong Sun; Qingyun Liu; Binxing Fang*

**HPCC-18: High Performance Computing and Applications (I) (Short Paper)**  
**Session Chair: Zeng Zeng, A\*STAR - Agency for Science, Technology and Research, Singapore**

1. [A Tucker Decomposition Based on Adaptive Genetic Algorithm for Efficient Deep Model Compression](#)  
*Cheng Dai; Hongqiang Cheng; Xingang Liu*
2. [Efficient Design of Hybrid Half-Band Multi-Stage Filter Based on Simulated Annealing Algorithm](#)  
*Chongwei Zheng; Wei Hu; Yonghao Wang; Jin Zhang; Zeng Zeng; Cen Chen*
3. [An Efficient Low Delay Task Scheduling Algorithm Based on Ant Colony System in Heterogeneous Environments](#)  
*Pei Yang; Jing Liu; Cen Chen; Yucheng Ding; Chunhua Deng; Zeng Zeng*

**HPCC-19: High Performance Computing and Applications (II) (Short Paper)**  
**Session Chair: Jiangkang Ren, Dalian University of Technology, China**

1. [Numerical Study of Fluid-Structure Interaction Dynamics Under High-Explosive Detonation on Massively Parallel Computers](#)  
*Sen Zhang; Xiaowei Guo; Chao Li; Yi Liu; Ran Zhao; Canqun Yang*
2. [An Efficient Approach to Vectorize the Hybrid Breadth-First Search](#)  
*Chi Zhu*
3. [An Improved Reinforcement Learning Approach to Solve Flow Job Scheduling Problems](#)  
*Dapeng Hu; Xuesong Jiang; Jian Wang*
4. [Performance Analysis and Optimization for MTTKRP of Sparse Tensor on CPU and GPU](#)  
*Rong Hu; Wangdong Yang; Xu Zhou; Kenli Li; Keqin Li*

**HPCC-20: High Performance Computing and Applications (III) (Short Paper)**

**Session Chair: He Li, Muroan Institute of Technology, Japan**

1. [Lightweight Proofs of Storage with Public Verifiability from Lattices](#)

*Miaomiao Tian*

2. [An Empirical Analysis on the Role of WSDL Metrics in Web Service Anti-Pattern Prediction](#)

*Sahithi Tummalapalli; Lov Kumar; Lalita Bhanu Murthy Neti; Aneesh Krishna*

3. [Observability in Kubernetes Cluster: Automatic Anomalies Detection Using Prometheus](#)

*Octavian Mart; Catalin Negru; Florin Pop; Aniello Castiglione*

4. [Communication Optimization Strategy for Molecular Dynamics Simulation on Sunway TaihuLight](#)

*Bei Wang*

**HPCC-21: Parallel and Distributed Computing and Systems (V) (Short Paper)**

**Session Chair: Ji Wang, National University of Defense Technology, China**

1. [Probing the Underlying Implementation Mechanisms of SW26010](#)

*Xiaomin Zhu*

2. [CPU-MIC Acceleration of Multiple-Point Statistical Simulation on Tianhe-2](#)

*Qiyu Chen; Gang Liu; Jia Liu; Zhesi Cui; Xiaogang Ma*

3. [Water Quality Prediction Approach Based on t-SNE and SA-BiLSTM](#)

*Jian Zhou; Feifei Chu; Xin Li; Haoyang Ma; Fu Xiao; Lijuan Sun*

4. [CBI: A Data Access Control System Based on Cloud and Blockchain Integration](#)

*Shuixiang Li; Ruixuan Li; Yu Zhang*

**HPCC-22: Parallel and Distributed Computing and Systems (VI) (Short Paper)**

**Session Chair: Bocheng Ren, Huazhong University of Science and Technology, China**

1. [A High-Efficiency and Comprehensive Dynamic Behavior Analysis System for Malware Based on Hardware Virtualization](#)

*Zhenquan Ding; Lei Cui; Haiqiang Fei; Longchuan Yan; Zhiyu Hao; Wang Yijing*

2. [Keyword Search Technology in Content Addressable Storage System](#)

*Feng Wang*

3. [Parallel Implementation of H.265 Intra-Frame Coding Based on FPGA Heterogeneous Platform](#)

*Wenjie Chen; Qunfang He; Shen Li; Xiao Bo; Mingsong Chen; Zhilei Chai*

4. [Transparent Overlapping of Blocking Communication in MPI Applications](#)

*Alexis Lescouet; Elisabeth Brunet; François Trahay; Gaël Thomas*

**HPCC-23: Parallel and Distributed Computing and Systems (IV) (Short Paper)**

**Session Chair: Jin Sun, Nanjing University of Science and Technology, China**

1. [Novel Bat Algorithms for Scheduling Independent Tasks in Collaborative Internet-Of-Things](#)

*Qingran Yan; Linhua Ma; Jin Sun*

2. [An Algorithm Controlling Response Time of Multi-Service Application Based on Bayesian Optimization](#)

*Mingchang Wei; Hongzhen Yang; Maolin Pan; Chaomeng Zhang; Yang Yu*

3. [A Balanced Cost Fault-Tolerant Scheduling Algorithm in Heterogeneous Real-Time Systems](#)

*Jing Liu; Yang Liu; Pei Yang; Yifu Zhang; Cen Chen; Ziqi Zhu; Zeng Zeng*



**HPCC-24: Communications and Networking (I) (Short Paper)**

**Session Chair: Xiaokang Zhou, Shiga University, Japan**

1. [A Deep Learning Framework Based on Spatial-Temporal Attention Mechanism for Traffic Prediction](#)

*Jun Hu; Bo Li*

2. [An Order Dispatch System Based on Reinforcement Learning for Ride Sharing Services](#)

*Zejiang Chen; Peng Li; Junlei Xiao; Nie Lei; Yu Liu*

3. [Deep Learning Based Multiple Energy Harvesting Users Cooperative Task Execution](#)

*Binbin Huang; Dongjin Yu; Linxuan Pan; Zhongjin Li; Haiyang Hu; Victor Chang*

**HPCC-25: Communications and Networking (VI) (Short Paper)**

**Session Chair: Wei Jiang, University of Electronic Science and Technology of China, China**

1. [Performance Evaluation of a Collaborative IoT Framework for Energy-Efficient Communities](#)

*Esther Palomar; Carlos Cruz; Ignacio Bravo; Alfredo Gardel*

2. [TBM: An Efficient Trajectory-Based Multicast Routing Protocol for Sparse UAV Networks](#)

*Jianfei Peng; Hang Gao; Liang Liu; Ningwei Li; Xiangyu Xu*

3. [Designing Optimized Topologies for On-Chip Massive Data Communication](#)

*Weifeng Liu; Linping Wu; Xiaowen Xu; Meng Guo*

**HPCC-26: Communications and Networking (VII) (Short Paper)**

**Session Chair: Guoxia Xu, Norwegian University of Science and Technology, Norway**

1. [Smart Ponzi Scheme Detection Using Federated Learning](#)

*Shuhui Fan; Haoran Xu; Shaojing Fu; Ming Xu*

2. [sxKV: A Novel Secured and Bidirectional Key-Value Data Structure](#)

*Ripon Patgiri*

3. [A Parallel Data Stream Layer for Large Data Workloads on WANs](#)

*Nooshin Eghbal; Paul Lu*



# The HPCC 2020 Technical Program

## Wednesday December 16, 2020

08:30-09:15	Keynote 5: Geoffrey Charles Fox, Indiana University, USA			
09:15-10:00	Keynote 6: Bingsheng He, National University of Singapore, Singapore			
10:00-10:10	Break			
10:10-12:15	HPCC-27 (Room1)	HPCC-28 (Room2)	HPCC-29 (Room3)	
12:15-13:10	Break			
13:10-14:50	HPCC-30 (Room1)	HPCC-31 (Room2)	HPCC-32 (Room3)	HPCC-33 (Room4)
14:50-15:00	Break			
15:00-16:40	HPCC-34 (Room1)	HPCC-35 (Room2)	HPCC-36 (Room3)	HPCC-37 (Room4)
16:40-16:50	Break			
16:50-18:30				

### HPCC-27: Parallel and Distributed Computing and Systems (I) (Short Paper)

Session Chair: Yan Huang, Kennesaw State University, USA

1. [FedMONN: Meta Operation Neural Network for Secure Federated Aggregation](#)

Dan Meng; Hongyu Li; Fan Zhu; Xiaolin Li

2. [High-Performance Object Detection for Optical Remote Sensing Images with Lightweight Convolutional Neural Networks](#)

Jia Liu; Renhua Liu; Kaijun Ren; Xiaoyong Li; Jianjian Xiang; Shaohua Qiu

3. [Multi-Ring On-Chip Interconnected Architecture for Spiking Neural Network Hardware Implementations](#)

Junxiu Liu; Dong Jiang; Yuling Luo; Senhui Qiu

4. [Dual-Loss Path CNNs Fusion Architecture for Image Restoration with Scattered Data](#)

Linli Xu; Jing Han; Lianfa Bai

5. [A Neural Network-Based Optimal Tile Size Selection Model for Embedded Vision Applications](#)

Xiaoyan Zhuo; Iman Nandi; Taha Azzaoui; Seung Woo Son

### HPCC-28: Parallel and Distributed Computing and Systems (II) (Short Paper)

Session Chair: Meng Han, Kennesaw State University, USA

1. [EdgeLD: Locally Distributed Deep Learning Inference on Edge Device Clusters](#)

Feng Xue; Weiwei Fang; Wenyan Xu; Qi Wang; Xiaodong Ma; Yi Ding

2. [Job Placement Strategy with Opportunistic Resource Sharing for Distributed Deep Learning Clusters](#)

Hongliang Li; Ting Sun; Xiang Li

3. [HySync: Hybrid Federated Learning with Effective Synchronization](#)

Guomei Shi; Li Li; Jun Wang; Wenyan Chen; Cheng-Zhong Xu; Kejiang Ye

4. [Overcoming Memory Constraint for Improved Target Classification Performance on Embedded Deep Learning Systems](#)

Fan Wu; Huanghe Liu; Zongwei Zhu; Cheng Ji; Chun Xue

5. [MAMAP: A Congestion Relieved Memetic Algorithm Based Mapping Method for Mapping Large-Scale SNNs onto NoC-Based Neuromorphic Hardware](#)

*Limeng Zhang; Shiming Li; Lianhua Qu; Ziyang Kang; Shiyang Wang; Jihua Chen; Lei Wang*

**HPCC-29: Communications and Networking (II) (Short Paper)**  
**Session Chair: Zhuojun Duan, James Madison University, USA**

1. [Chameleon: Image Style Transfer Based on Image Classification Networks](#)

*Haobo Li; Lei Gong; Chao Wang*

2. [Mobility-Aware Latency-Efficient Cache Placement in Mobile Edge Networks](#)

*Lubna Mohammed; Alagan Anpalagan; Ahmed Shaharyar Khwaja; Muhammad Jaseemuddin*

3. [Building Scenarios on Mobile Network Testbed with a Transmission Characteristics Similarity Model](#)

*Haipeng Du; Weizhan Zhang; Xuanyu Wang; Shouqin Huang; Qinghua Zheng*

4. [ConfigRand: A Moving Target Defense Framework Against the Shared Kernel Information Leakages for Container-Based Cloud](#)

*Tong Kong; Liming Wang; Kai Chen; Duohe Ma; Zhen Xu; Yijun Lu*

**HPCC-30: Communications and Networking (III) (Short Paper)**  
**Session Chair: Omer Adam, Kuwait College of Science and Technology, Kuwait**

1. [A Deep-Shallow Network for Passive Underwater Target Recognition](#)

*Gaoyu Song; Xingang Liu; Xin Zeng; Hengguang Luo; Dayu Wang; Boxuan Zhang*

2. [Attention-Guided Multiv-View Stereo Network for 3D Depth Estimation](#)

*Penghui Sun; Suping Wu; Kui Lin*

3. [Privacy-Preservation in Distributed Deep Neural Networks via Encryption of Selected Gradients](#)

*Emmanuel Antwi-Boasiako; Shijie Zhou; Yongjian Liao; Qihe Liu*

**HPCC-31: Communications and Networking (IV) (Short Paper)**  
**Session Chair: Peng Li, University of Aizu, Japan**

1. [BB-PKI: Blockchain-Based Public Key Infrastructure Certificate Management](#)

*Abba Garba; Qinwen Hu; Zhong Chen; Muhammad Rizwan Asghar*

2. [Bycon: A Byzantine-Fault-Tolerant Consensus Algorithm](#)

*Xiuhong Zou; Chenyang Li; Kejing He*

3. [Weighting Factors Optimization for Nonbinary LDPC Codes Based on Extended Min-Sum Algorithm](#)

*Mingjuan Qiu; Ming Zhan*

4. [Fast Algorithms for Spatial K-Core Discovery and Maintenance](#)

*Hao Yang; Keyi Wang; Renjie Sun; Xiaoyang Wang*

**HPCC-32: Communications and Networking (V) (Short Paper)**  
**Session Chair: Zecan Yang, Huazhong University of Science and Technology, China**

1. [Importance Ranking Method of Multiple Attributes of Network Nodes](#)

*Qingcun Zhu; Xuesong Jiang; Xiumei Wei*

2. [LNAD: Towards Lightweight Network Anomaly Detection in Software-Defined Networking](#)

*Yunhe Cui; Qing Qian; Huanlai Xing; Saifei Li*

3. [Optimal All-To-All Personalized Communication on Butterfly Networks Through a Reduced Latin Square](#)

**HPCC-33: Communications and Networking (VIII) (Short Paper)**

**Session Chair: Yulei Wu, Univeristy of Exeter, UK**

1. [An Initial Parameters Optimization Scheme for High-Performance EP Based MIMO Detection](#)

GuoQiang Yao; Hang Chen; Jianhao Hu

2. [UWB/INS Based Indoor Positioning and NLOS Detection Algorithm for Firefighters](#)

Gang Yang; Shiling Zhu; Qiang Li; Kesong Zhao

3. [AFTM: An Adaptive Flow Table Management Scheme for OpenFlow Switches](#)

Yi Shen; Chunming Wu; Qiumei Cheng; Dezhang Kong

4. [A Novel Economical Design of Multistage Decimators for Low Latency Audio Applications](#)

Chongwei Zheng; Wei Hu; Yonghao Wang; Jing Liu; Cen Chen; Zeng Zeng

**HPCC-34: Communications and Networking (IX) (Short Paper)**

**Session Chair: Hao Wang, Norwegian University of Science and Technology, Norway**

1. [Formal Modeling and Verification of EDCA Based on Probabilistic Model Checking](#)

Yixuan Zan; Xiaojuan Li; Yong Guan; Rui Wang

2. [Automatic Modulation Classification Using Combination of Variational Mode Decomposition and Multifractal Analysis](#)

Bingyang Li; Wen Wang; Meng Zhang

3. [Adaptive Video Streaming Transmission Mechanism Based on Wireless NDN](#)

Xiaojie Ding; Wang Yang; Fan Wu

4. [Towards Semantic Travel Behavior Prediction for Private Car Users](#)

Huiling Chen; Dong Wang; Chenxi Liu

**HPCC-35: Communications and Networking (X) (Short Paper)**

**Session Chair: Di Wu, Norwegian University of Science and Technology, Norway**

1. [GPTE: Efficient Graph Partitioning-Based Traffic Engineering in Hybrid SDN/IP Networks](#)

Huijun Dai

2. [Quantization and Knowledge Distillation for Efficient Federated Learning on Edge Devices](#)

Xiaoyang Qu

3. [An Online Reinforcement Learning Offloading Method for Delay-Sensitive Vehicular Service](#)

Weirong Liu; Xingju Shao; Chenglong Wang; Xin Gu; Fu Jiang; Jun Peng

4. [Value-Based Algorithms Optimization with Discounted Multiple-Step Learning Method in Deep Reinforcement Learning](#)

Haibo Deng; Yin Shiqun; Xiaohong Deng; Shiwei Li

**HPCC-36: High-Performance Mobile Edge Computing (I) (Short Paper)**

**Session Chair: Fei Hao, Univeristy of Exeter, UK**

1. [Enabling Self-Defined Navigation on Road Graph via Double Rewarded Generalized VIN](#)

Xiaojuan Wei; Jinglin Li; Quan Yuan; Zhe Zhang; Yangyang Zha; FangChun Yang

2. [A Method for Classification of Heavy Mineral Based on Machine Learning](#)

Huizhen Hao; Xutong Jiang; Yuhu Sun; Wanchun Dou; Qing Gu

3. [A Neural Model for Automatic Bidding of Contract Bridge](#)

*Xiaoyu Zhang; Wei Liu; FangChun Yang*

**HPCC-37: High-Performance Mobile Edge Computing (II) (Short Paper)**  
**Session Chair: Huaming Wu, Tianjin University, China**

1. [Group - Oriented Location Privacy Protection for Mobile Users](#)

*Yali Ji; Ruowei Gui; Xiaolin Gui; Huijun Dai*

2. [HF-BF: A Hotness-Aware Fine-Grained Bloom Filter for Unique Address Checking in IoT Blockchain](#)

*Zhu Wenbin; Qun Ma; Zhaoyan Shen; Tianyu Wang; Zhiping Jia*

3. [HttpDNS: A Flexible Architecture for Edge Server Exploration and Selection in 5G Network](#)

*Yuchao Zhang; Shuang Wu; Wendong Wang; Yunbo Han; Zhuoyu Zhang*

4. [Privacy-Aware Key Task Scheduling in Vehicular Networks Based on Incentive Mechanism](#)

*Youhua Xia; Libing Wu; Jiong Jin; Tiehua Zhang; Xi Zheng*

# The SmartCity 2020 Technical Program

## Monday December 14, 2020

09:00-09:30	Opening and Award Ceremony			
09:30-10:15	Keynote 1: S. S. Iyengar, Florida International University, USA			
10:15-10:30	Break			
10:30-12:10				
12:10-13:10	Break			
13:10-14:50			SmartCity-1 (Room3)	SmartCity-2 (Room4)
14:50-15:00	Break			
15:00-15:45	Keynote 2: Mateo Valero, Technical University of Catalonia, Spanish.			
15:45-16:00				
16:00-17:40				SmartCity-3 (Room4)
17:40-17:50	Break			
17:50-19:30				

### SmartCity-1: Enabling Technologies for Smart City

**Session Chair: Debin Liu, Huazhong University of Science and Technology, China**

1. [BeaCloud: A Generic Architecture for Sustainable Smart City Using Bluetooth Beacons](#)

*Raiful Hasan; Ragib Hasan*

2. [IEEE 802.11 WLAN Based Indoor Positioning Algorithm Using Weight Grey Prediction Model](#)

*Jing Wang*

3. [DynaScale: An Intelligent Image Scale Selection Framework for Visual Matching in Smart IoT](#)

*Bo-Lung Tsai; Kwei Jay Lin; Yuheng Cao; Yu Meng*

4. [Adversarial Training for Underwater Target Recognition in Complex Marine Conditions](#)

*Xin Zeng; Xingang Liu; Gaoyu Song; Dayu Wang; Hengguang Luo; Boxuan Zhang*

### SmartCity-2: Big City Data and Mining (I)

**Session Chair: Yinxue Yi, Chongqing University of Posts and Telecommunications, China**

1. [Vector Field Model for Trajectory Data and Its Application in Similarity Query](#)

*Yiling Jia; Che-Rung Lee*

2. [Traffic Monitoring with Google Map Data \(a Case of Tehran\)](#)

*Sepideh Zare Pour Sohi; Saeed Banihashemi*

3. [Distributed-To-Centralized Data Management Through Blockchain Technologies in Smart University](#)

*Amir Sinaeepourfard; Ali Dorri*

### SmartCity-3: Smart City Services

**Session Chair: Ahmadreza Vajdi, Nanjing University of Science and Technology, China**

1. [A Novel Developer Portrait Model Based on Bert-Capsule Network](#)

*Yirui Wu; Yupeng Yu; Benze Wu*

2. [A Novel SMOTE Algorithm Based Portrait Model for Programmers](#)

*Yirui Wu; Shun Zhao; Yupeng Yu*

3. [Image Recognition System of Pointer Meter in Substation](#)

*GuiLiang Li; Biao Tang; Bo Li; Xinyuan Luo; Yong Liang*

# The SmartCity 2020 Technical Program

## Wednesday December 16, 2020

08:30-09:15	Keynote 5: Geoffrey Charles Fox, Indiana University, USA			
09:15-10:00	Keynote 6: Bingsheng He, National University of Singapore, Singapore			
10:00-10:10	Break			
10:10-12:15				SmartCity-4 (Room4)
12:15-13:10	Break			
13:10-14:50				
14:50-15:00	Break			
15:00-16:40				
16:40-16:50	Break			
16:50-18:30	SmartCity-5 (Room1)	SmartCity-6 (Room2)		

### SmartCity-4: Big City Data and Mining (II)

**Session Chair: Carson Leung, University of Manitoba, Canada**

1. [A Survey on Randomized Mechanisms for Statistical Learning Under Local Differential Privacy](#)

*Datong Wu; Xiaotong Wu; Xiaolong Xu; Lianying Qi*

2. [Prediction of Food Preparation Time in the COVID-19 Era](#)

*Carson K. Leung*

3. [Deep Spatial-Temporal Inception Network for Traffic Flow Prediction](#)

*Penggui Huang; Bi Huang; Zhao Fan; Yanfeng Zhang; Mingong Chen*

4. [Fog Computing Security Assessment for Device Authentication in the Internet of Things](#)

*Saud Al Harbi; Talal Halabi; Martine Bellaïche*

### SmartCity-5: Smart City Systems (I)

**Session Chair: Xin Nie, Huazhong University of Science and Technology, China**

1. [Componentry Analysis of Intelligent Transportation Systems in Smart Cities Towards a Connected Future](#)

*Priyanka Trivedi; Farhana H. Zulkernine*

2. [Analysis of Urban Traffic Incidents Through Road Network Features](#)

*Takfarinas Saber; Laurentiu Capatina; Anthony Ventresque*

3. [Travel Time Prediction in Missing Data Areas: Feature-Based Transfer Learning Approach](#)

*Sayda Elmi; Kian Lee Tan*

4. [A Privacy Preserving Framework for Smart Cities Utilising IoT, Smart Buildings and Big Data](#)

*Catherine Inibhunu; Carolyn McGregor, AM*

5. [RONIN: A SUMO Interoperable Mesoscopic Urban Traffic Simulator](#)

*Takfarinas Saber; Côme Cachard; Anthony Ventresque*

### SmartCity-6: Smart City Systems (II)

**Session Chair: Guoxia Xu, Norwegian University of Science and Technology, Norway**

1. [Collaborative Multi-Object Tracking as an Edge Service Using Transfer Learning](#)

*Han Sun; Yu Chen; Alex Aved; Erik Blasch*

2. [An Intelligent Traffic Light Control System Based on Dual Mode Special Vehicle Identification](#)

*Beilei Cui; Erxiang Ren; Li Luo*

3. [Hybrid Resource Orchestration and Scheduling for Cyber-Physical-Human Systems](#)

*Jianyong Zhu; Xu Wang; Tianyu Wo; Chunming Hu*

4. [Edge Intelligence Empowered Distribution Path Planning with Internet of Vehicles](#)

*Tiancai Li; Yiping Wen; Zheng Tan; Hong Chen*

5. [A Multi-Objective Genetic GAN Oversampling: Application to Intelligent Transport Anomaly Detection](#)

*Wayoud Bouzeraib; Afifa Ghenai; Nadia Zeghib*



# The DSS 2020 Technical Program

## Tuesday December 15, 2020

08:00-08:45	Keynote 3: Sumi Helal, University of Florida, US		
08:45-09:30	Keynote 4: Honggang Wang, UMass Dartmouth, USA		
09:30-09:40	Break		
09:40-12:10			DSS-1 (Room4)
12:10-13:10	Break		
13:10-14:50			DSS-2 (Room4)
14:50-15:00	Break		
15:00-16:40			DSS-3 (Room4)
16:40-16:50	Break		
16:50-18:30			DSS-4 (Room4)
18:30-18:40	Break		
18:40-20:20			

### DSS-1: Data Processing Technology

Session Chair: Huazhong Liu, Hainan University, China

1. [A Proactive Uncertainty Driven Model for Data Synopses Management in Pervasive Applications](#)

Kostas Kolomvatsos

2. [Selective Combination Based on Diversity-Accuracy Balance in Outlier Ensembles](#)

Limin Shi; Chao Zhu; Xu-Cheng Yin

3. [Spatial Data Analytics of COVID-19 Data](#)

Carson K. Leung

### DSS-1: Data Systems

Session Chair: Huazhong Liu, Hainan University, China

1. [On the Design of SMR HDD Block Device Driver](#)

Jingpeng Hao; Xubin Chen; Yifan Qiao; Yuyang Zhang; Tong Zhang

2. [Calibration Data-Based CNN Filter Pruning for Efficient Layer Fusion](#)

Krishna Teja Chitty-Venkata; Arun Somani

3. [Design of Direct Read from Sparse Segments in MPI-IO](#)

Kohei Sugihara; Osamu Tatebe

### DSS-2: Data Science

Session Chair: Leilei Yan, Soochow University, China

1. [Hybrid Model of Vehicle Recognition Based on Convolutional Neural Network](#)

Chan Su; Jianguo Wei

2. [The Most Outperforming Fine-Tuned Text Classification Model Based-On Bert](#)

Samin Mohammadi; Mathieu Chapon

3. [Analysing Business Process Anomalies Using Discrete-Time Markov ChainsComputational Finance](#)

Lingkai Yang; Sally I McClean; Mark Donnelly; Kashaf Khan; Kevin Burke

4. [The Impact of Social and Economic Development on the Spread of Infectious Respiratory Diseases, Push or Constrain? Empirical Research from China Based on Machine Learning Methods](#)

*Ke Yuan; Yabing Huang; Qian Tang*

#### **DSS-3: Data Applications**

**Session Chair: Shengbin Liang, Henan University, China**

1. [Double Channel CNN-LSTM Model for Text Classification](#)

*Shengbin Liang; Wencai Du; Jixin Ma; Bin Zhu; Yuying Zhang; Suying Cheng*

2. [Applying an Adaptive Multi-Population Optimization Algorithm to Enhance Machine Learning Models for Computational Finance](#)

*Zhixi Li; Vincent Tam; Lawrence K. Yeung; Zhenglong Li*

3. [Improving the Identification of Co-Occurring Driver Pathways by Integrating Multi-Omics Data](#)

*Qi Rong Cai*

4. [Temporal Analysis for Epileptic Seizure Detection by Using Data Mining Approach](#)

*Francesca Paffer; Gaetano Zazzaro; Angelo Martone; Paolo Bifulco; Luigi Pavone*

#### **DSS-4: Data Science and Systems (Short Paper)**

**Session Chair: Jinke Wang, Henan University, China**

1. [Expression Recognition of Dual Channels Model System Based on Mini Xception SE](#)

*Chan Su; Jianguo Wei*

2. [Customer Segment Application of Machine Learning in Business Operation of China Mobile](#)

*Qiaoyu Li; Wei Yang; Ying Liu; Xiaofang Liu; Yaohong Zhao; Jun Chu; Haitao Zeng; Xuefeng Zhao; Chao Deng; Junlan Fe*

3. [Health Status Assessment for DK-2 Brake Equalizing Reservoir Control System Based on the Physical Health Indicators and BP Network](#)

*Dianzhu Gao; Jun Peng; Shengnan Wang; Yijun Cheng; Yingze Yang; Yun Cheng; Yao Lu; Xiaoyong Zhang*

4. [Access Control of e-Agricultural Blockchain Based on Dual-Policy Attribute-Based Encryption](#)

*Daojun Han; Jinyu Chen; Lei Zhang; Yatian Shen; Xuehen Wang; Yihua Gao*

# The DependSys 2020 Technical Program

## Tuesday December 15, 2020

08:00-08:45	Keynote 3: Honggang Wang, UMass Dartmouth, USA			
08:45-09:30	Keynote 4: Sumi Helal, University of Florida, USA			
09:30-09:40	Break			
09:40-12:10	DependSys-1 (Room1)	DependSys-2 (Room2)	DependSys-3 (Room3)	
12:10-13:10	Break			
13:10-14:50				
14:50-15:00	Break			
15:00-16:40				
16:40-16:50	Break			
16:50-18:30				
18:30-18:40	Break			
18:40-20:20				

### DependSys-1: Security Fundamentals and Technologies (Short Paper)

**Session Chair:** Yuxiang Zhu, Huazhong University of Science and Technology, China

1. [A New Agent-based Modeling Simulation for Compression Using the Echolocation System in Dolphins](#)

*Khaldoon Dhou; Christopher Cruzen*

2. [An Attack Tree Template Based on Feature Diagram Hierarchy](#)

*Rajesh Kuma; Hima Siva Kalyan Reddy*

### DependSys-1: Dependable and Secure Systems (Short Paper)

**Session Chair:** Yuxiang Zhu, Huazhong University of Science and Technology, China

1. [Network Virtualization Proof of Concept for Remote Management of Multi-Tenant Infrastructure](#)

*Stephen Ugwuanyi; ukRameez Asif; James Irvine*

2. [Privacy Preservation of Aggregated Data Using Virtual Battery in the Smart Grid](#)

*Fawaz Kserawi; Qutaibah m. Malluhi*

3. [LoRaWAN v1.1 Security: Are We in the Clear Yet?](#)

*Sumesh J. Philip; James M. McQuillan; Oluwatoba Adegbite*

### DependSys-2: Security Fundamentals and Technologies (I)

**Session Chair:** Nicholas J. Gati, Huazhong University of Science and Technology, China

1. [Modeling and Analysis of Malware Propagation for Cluster-based Wireless Sensor Networks](#)

*Xuejin Zhu; Jie Huang; Chunyang Qi; Xiaowen Wang*

2. [A Scalable Blockchain Based System for Super Resolution Images Manipulation](#)

*Antonio Rapuano; Gerardo Iovane; Marta Chinnici*

3. [HBD-Authority: Streaming Access Control Model for Hadoop](#)

**DependSys-2: Security Fundamentals and Technologies (II)**

**Session Chair: Nicholas J. Gati, Huazhong University of Science and Technology, China**

1. [A Secret Sharing Scheme Based on Game Theory and BP Neural Network](#)

*Qiuxian Li; Quanxing Zhou; Qixin Pan; Lingyun Wang; Hongfa Ding*

2. [Free Chain: Enabling Freedom of Expression through Public Blockchains](#)

*Israa Alsarsour; Qutaibah Malluhi; Yongge Wang*

3. [An Ensemble Feature Selection Method for IoT IDS](#)

*Alaa Alhowaide; Izzat Alsmadi; Jian Tang*

**DependSys-3: Dependable and Secure Systems**

**Session Chair: Shunli Zhang, Huazhong University of Science and Technology, China**

1. [Dependable Wildlife DTN: Wearable Animal Resource Optimization for Sustainable Long-term Monitoring](#)

*Keiji Nakagawa; Daisuké Shimotoku; Junya Kawase; Hill Hiroki Kobayashi*

2. [Real-Time Fault Detection and Diagnosis of CPS Faults in DEVS](#)

*Joseph Boi-Ukeme; Cristina Ruiz-Martin; Gabriel Wainer*

3. [Physical Fingerprinting of Ultrasonic Sensor and Applications to Sensor Security](#)

*Eric Cheek; Dhimant Khuttan; Raghu Chandalvala; Hafiz Malik*

**DependSys-3: Dependability and Security Measures and Assessments**

**Session Chair: Shunli Zhang, Huazhong University of Science and Technology, China**

4. [Cognitive Privacy: AI-enabled Privacy using EEG Signals in the Internet of Things](#)

*Francesco Schiliro; Nour Moustafa; Amin Beheshti*

5. [Investigating Root Causes of Authentication Failures Using a SAML and OIDC Observatory](#)

*Jim Basney; Phuong Cao; Terry Fleury*

6. [A Novel Approach for Predictive Maintenance Combining GAF Encoding Strategies and Deep Networks](#)

*Antonino Ferraro; Antonio Galli; Vincenzo Moscato; Giancarlo Sperli*

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