



2020

IEEE WORLD CONGRESS ON SERVICES

October 18-24

Beijing, China and online through virtual presentation



IEEE



IEEE
COMPUTER
SOCIETY



清华大学
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PROGRAM AT A GLANCE - Monday October 19

Time (UTC)	Sessions	
1:00 - 1:30	BEIJING OPENING SESSION OPENING REMARKS BY LEILA DE FLORIANI, 2020 IEEE COMPUTER SOCIETY PRESIDENT	
1:30 - 2:30	BEIJING KEYNOTE: FEIFEI LI, ALIBABA GROUP CLOUD NATIVE DATABASE SYSTEMS FOR ENTERPRISE APPLICATIONS	
2:40 - 4:20	Tutorial 1	AISA Workshop 1
6:00 - 7:20		AISA Workshop 2
7:40 - 9:40		AISA Workshop 3
7:00 - 8:20	Tutorial 2	CSRIOT Workshop 1
8:40 - 10:00	Tutorial 2	WNS Workshop 1
11:00 - 14:00	WISC Symposium - I, II, III	
13:00 - 14:20	Tutorial 3	CSRIOT Workshop 2
14:40 - 16:00	Tutorial 3	WNS Workshop 2
19:00 - 22:00	Tutorial 4	

PROGRAM AT A GLANCE - Tuesday October 20

Time (UTC)	Sessions				
1:00 - 2:20	CLOUD 1	ICWS 1	SCC 1	EDGE 1	SMDS 1
2:40 - 4:00	CLOUD 2	ICWS 2	SCC 2	EDGE 2	SMDS 2
7:00 - 8:20	CLOUD 3	ICWS 3	SCC 3	EDGE 3	DS 1
8:40 - 10:00	CLOUD 4				DS 2
12:00 - 14:00	CONGRESS OPENING & KEYNOTE 1: DAVID HAREL, WEIZMANN INSTITUTE OF SCIENCE; ISRAEL ACADEMY OF SCIENCES & HUMANITIES ON ODOR REPRODUCTION, AND HOW TO TEST FOR IT				
14:40 - 16:00	PLENARY PANEL 1: SOFTWARE SERVICE ENGINEERING AND ITS ECOSYSTEM EVOLUTION				
19:00 - 20:20	CLOUD 5 (SYMPOSIUM)	ICWS 4	SCC 4		
20:40 - 22:00	CLOUD 6 (SYMPOSIUM)	ICWS 5	SCC 5		

PROGRAM AT A GLANCE - Wednesday October 21						
Time (UTC)	Sessions					
1:00 - 2:20	CLOUD 7	ICWS 6	SCC 6	EDGE 4	SMDS 3	PLA1
2:40 - 4:00	CLOUD 8	ICWS 7	SCC 7	EDGE 5	SMDS 4	DHS 1/ PHP
7:00 - 8:20	CLOUD 9	ICWS 8	SCC 8	EDGE 6		
8:40 - 10:00	CLOUD 10	ICWS 9	SCC 9			
11:00 - 13:00	SYMPOSIUM ON WOMEN IN SERVICES COMPUTING - SESSIONS IV, V					
13:00 - 14:20	KEYNOTE 2: OZAN TONGUZ, CARNEGIE MELLON UNIVERSITY ON THE FUTURE OF SMART TRANSPORTATION WITH AI					
14:40 - 16:00	PLENARY PANEL 2.1: SMART DATA AND DIGITAL HEALTH SERVICES BEYOND COVID-19					
19:00 - 20:40	KEYNOTE 3: WENDY NILSEN, NATIONAL SCIENCE FOUNDATION PLENARY PANEL 2.2: FUTURE OF HOME, OFFICE, SCHOOL IN THE AGE OF PANDEMIC					

PROGRAM AT A GLANCE - Thursday October 22						
Time (UTC)	Sessions					
1:00 - 2:20	CLOUD 12	ICWS 11	SCC 11	IND 1	SMDS 5	COS 1
2:40 - 4:00	CLOUD 13	ICWS 12	SCC 12	IND 2		COS 2
7:00 - 8:20	KEYNOTE 4: DONG XIE, IBM GREATER CHINA GROUP IT SERVICES AFTER COVID-19					
8:40 - 10:00	PLENARY PANEL 3: SERVICEOLOGY: ADVANCING SCIENTIFIC FOUNDATIONS FOR MODERN DIGITAL SERVICES					
13:00 - 14:20	CLOUD 14	ICWS 13	SCC 13	IND 3		COS 3
14:40 - 16:00	CLOUD 15 (SYMPOSIUM)	ICWS 14	SCC 14	IND 4		
19:00 - 20:20	CLOUD 16	ICWS 15		FFS 1 (SCC)		
20:40 - 22:00	CLOUD 17			FFS 2 (SCC)		

PROGRAM AT A GLANCE - Friday October 23

Time (UTC)	Sessions					
1:00 - 2:20	CLOUD 18	ICWS 16		FFS 3 (SCC)		
2:40 - 4:00	CLOUD 19	ICWS 17	SCC 15			
7:00 - 8:20	CLOUD 20	ICWS 18	SCC 16			
8:40 - 10:00	CLOUD 21	ICWS 19	SCC 17			
13:00 - 14:20	IEEE AWARDS					
14:40 - 16:00	CLOUD 22	ICWS 20				PLA 2
19:00 - 20:40	KEYNOTE 5: K. SELÇUK CANDAN, ARIZONA STATE UNIVERSITY SMART DATA SERVICES FOR SENSEMAKING IN HUMAN-CENTERED DYNAMIC SYSTEM					
20:40 - 22:00	PLENARY PANEL 4: OPPORTUNITIES FOR DATA ANALYTICS/MACHINE LEARNING SERVICE IN THE ERA OF COVID-19					

PROGRAM AT A GLANCE - Saturday October 24

Time (UTC)	Sessions			
1:00 - 2:20	CLOUD 23	ICWS 21		
2:40 - 4:00	CLOUD 24	ICWS 22	SEC	
7:00 - 8:20	CLOUD 25	ICWS 23	WHI/FIN	
8:40 - 10:00	CLOUD 26	ICWS 24	WCS 1/ WKN	
13:00 - 14:20	CLOUD 27 & 28	ICWS 25 & 26	WCS 2/ WKN	SCM
14:40 - 16:00	CONCLUDING SESSION (ALL INVITED)			

2020 IEEE SERVICES CONGRESS - Organizing Team

Steering Committee

Chair: Carl K. Chang, Iowa State University
Elisa Bertino, Purdue University
Rong N. Chang, IBM Research, TJ Watson Research Center
Peter Chen, Carnegie Mellon University
Ernesto Damiani, University of Milan
Ian Foster, University of Chicago
Dennis Gannon, Indiana University
Frank Leymann, University of Stuttgart
Hong Mei, Beijing Institute of Technology
Stephen S. Yau, Arizona State University

SERVICES Congress Honorary General Chairs

Stephen S. Yau, Arizona State University
Peter Chen, Carnegie Mellon University

SERVICES Congress General Chairs

Elisa Bertino, Purdue University
Hong Mei, Peking University

SERVICES Congress Symposia General Chair

Rong N. Chang, IBM Research, TJ Watson Research Center

SERVICES Congress Program Chairs in Chief

Ernesto Damiani, University of Milan
Zhi Jin, Peking University

Finance Chair

Shiyong Lu, Wayne State University

Publications Chairs

Katsunori Oyama, Nihon University (Senior Publication Chair)
Anxiang Ma, Northeastern University (Vice Publication Chair)
Zhongjie Wang, HIT (Publication Chair)

Registration Chairs

Jingwei Yang, California State University - Sacramento
Haiyan Zhao, Peking University

Panel Chairs

Hemant Jain, The University of Tennessee at Chattanooga
George Spanoudakis, City University of London
Yanbo Han, North China University of Technology

Workshop Chairs

Stephan Reiff-Marganiec, University of Derby
Bo Cheng, Beijing University of Posts & Telecommunications

Tutorial Chair

Lin Liu, Tsinghua University

Industry Chair

Min Fu, LIZHI Inc.

Hackathon Chair

Jinjun Xiong, IBM Research, TJ Watson Research Center

Hackathon Committee

Sen Chen, Nanyang Technological University
Sue Ann Chen, IBM Research Australia
Jaejoon Lee, University of East Anglia
Xiao Ma, Beijing University of Posts & Telecommunications
Giovanni Quattrocchi, Politecnico di Milano
Ao Zhou, Beijing University of Posts & Telecommunications
Jia Zou, Arizona State University

Doctoral Symposium Chairs

Jery Li, IBM Research China
Bing Li, Wuhan University
Barbara Carminati, University of Insubria

Local Arrangements Chairs

Xuanzhe Liu, Peking University
Leye Wang, Peking University

Publicity Chairs

Nimanthi Atukorala, Augsburg University
Paolo Ceravolo, University of Milan
Xuanzhe Liu, Peking University

Web Chair

Laurel Ming

The 2020 IEEE World Congress on SERVICES includes the following conferences:

IEEE International Conference on Cloud Computing (CLOUD)

Being the first IEEE conference dedicated to cloud computing, IEEE International Conference on Cloud Computing (CLOUD) has been a prime international forum for both researchers and industry practitioners to exchange the latest fundamental advances in the state of the art and practice of cloud computing, identify emerging research topics, and define the future of cloud computing. All topics regarding cloud computing align with the theme of CLOUD.

CLOUD 2020 Chairs

General Chair: Latifur Khan, University of Texas at Dallas

General Chair: Gang Huang, Peking University

Program Chair: Claudio Ardagna, University of Milan

Program Chair: Shangguang Wang, Beijing University of Posts & Telecommunications

IEEE International Conference on Edge Computing (EDGE)

IEEE International Conference on Edge Computing (EDGE) aims to become a prime international forum for both researchers and industry practitioners to exchange the latest fundamental advances in the state of the art and practice of Edge computing, identify emerging research topics, and define the future of Edge computing. EDGE covers the localized resource sharing and connections with the cloud.

EDGE 2020 Chairs

General Chair: Shangguang Wang, Beijing University of Posts & Telecommunications

General Chair: Schahram Dustdar, Technical University of Vienna

General Chair: Xiaodong Duan, China Mobile Research Institute

Program Chair: Xuanzhe Liu, Peking University

Program Chair: Mudhakar Srivatsa, IBM Research, TJ Watson Research Center

Program Chair: Tao Sun, China Mobile Research Institute

IEEE International Conference on Web Services (ICWS)

IEEE International Conference on Web Services (ICWS) has been a prime international forum for both researchers and industry practitioners to exchange the latest fundamental advances in the state of the art and practice of Web-based services, identify emerging research topics, and define the future of Web-based services. All topics regarding Web-based services lifecycle study and management align with the theme of ICWS.

ICWS 2020 Chairs

General Chair: Andrzej Goscinski, Deakin University

General Chair: Zhiyong Feng, Tianjin University

Program Chair: Elena Ferrari, University of Insubria

Program Chair: Jing Fan, Zhejiang University of Technology

IEEE International Conference on Services Computing (SCC)

Services account for a major part of the IT industry today. Companies increasingly like to focus on their core expertise area and use IT services to address all their peripheral needs. Services Computing is a new science which aims to study and better understand the foundations of this highly popular industry. It covers the science and technology of leveraging computing and information technology to model, create, operate, and manage business services.

SCC 2020 Chairs

General Chair: Kumar Bhaskaran, IBM Research, TJ Watson Research Center

General Chair: Xiaofei Xu, Harbin Institute of Technology

Program Chair: Luciano Baresi, Politecnico of Milan

Program Chair: Jia Zhang, Southern Methodist University

Program Chair: Jianwei Yin, Zhejiang University

Local Chair: Shuiguang Deng, Zhejiang University

IEEE International Conference on Smart Data Services (SMDS)

The IEEE International Conference on Smart Data Services (SMDS) (formerly the IEEE Big Data Congress) is the flagship theme-topic conference for data-driven applications and smart data-aware solutions under the as-a-service model, including analytic & learning-based services, smart data infrastructures, big data management, data quality and trustworthiness, data computing at the edge/IoT systems, and case studies of smart data services. IEEE SMDS aims to bring together researchers and practitioners working on AI, Systems, Data Science, and Services Computing to provide a dynamic and interactive forum to present and discuss their latest research findings, results, and challenges in this emerging area of mutual interest.

Smart Data Services 2020 Chairs

General Chair: Selcuk Candan, Arizona State University

General Chair: Mohand-Said Hacid, University of Lyon

General Chair: Zhaohui Wu, Zhejiang University

Program Chair: Laurence Yang, St. Francis Xavier University

Program Chair: Tefvik Kosar, University of Buffalo

Program Chair: Hongbing Wang, Southeast University

The 2020 World Congress on Services includes the following symposia:

2nd IEEE Digital Health as a Service Symposium (DHAASS/SMDS Symposium)

2nd IEEE Symposium on Future of Financial Services (FFS/SCC Symposium)

IEEE Women in Services Computing Symposium (WISC)

CLOUD Symposium

Industry Symposium

Doctoral Symposium

and workshops:

2nd IEEE SERVICES Workshop on Network Services (NS)

1st IEEE SERVICES Workshop on Artificial Intelligence and Services Adaption (AISA)

The 1st IEEE SERVICES Workshop on the Software Integrating Collective Service, Intelligence and Ecosystem (COSINE): A New Software Development Methodology and Environment

2nd IEEE SERVICES Workshop on Cyber Security and Resilience in the Internet of Things (CSRIOT)

1st IEEE SERVICES Workshop on Crossover Services (IWCS)

2nd IEEE SERVICES Workshop on Knowledge Networks (KN)

1st IEEE SERVICES Workshop on Data-centric Workflows on Heterogeneous Infrastructures: Challenges and Directions (DAWHI)

8th IEEE SERVICES Workshop on Software Engineering FOR/IN the Cloud (FORINC)

1st IEEE SERVICES Workshop on Satellite Edge Computing (WoSEC)

2nd IEEE SERVICES Workshop on Big Data for Public Health Policy Making (BigPHP)

IEEE SERVICES 2020 HACKATHON



IEEE

IEEE Services Hackathon is an event collocated with the 2020 IEEE World Congress on Services (SERVICES 2020), and is sponsored by the IEEE Computer Society. The IEEE Computer Society established the services computing initiative two decades ago in response to the fast-growing service industry as well as the exponential rise in computing professionals.



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At the IEEE Services Hackathon, we want services computing to feel relatable to students who are about to embark on their professional career, and show how services computing can be used to help people improve the quality of life. The Hackathon provides a platform for enthusiastic and driven students from a diverse range of backgrounds to collaborate and bring innovative ideas within the services computing industry to life, while providing them with an opportunity to engage with industry mentors.

Teams have the opportunity to engage and collaborate with other students who come from different backgrounds, as well as demonstrate and hone your programming, presentation and analytical skills.

Who can participate?

The Hackathon is open to all undergraduate and postgraduate students from Universities and institutions worldwide who are 18 years and older. We do ask, however, that you inform the organisers where you are currently based as well as your academic background to ensure a smooth and enjoyable Hackathon experience. Registration Deadline: Oct 17th, 2020.

How many people can be in a team?

Teams must have between four and six people. If your team has less than the minimum requirements, we will ask you to merge with another team before the competition. We reserve the right to relax this requirement on the day on a team-by-team basis.

Website: <https://ieeeservices.github.io/>

Problem Description: <https://github.com/IEEEServices/hackathon/>

Participant Registration: <https://ieeeservices-quill.herokuapp.com/login>

Mentor Registration: <https://forms.gle/mzCH7mMToG7DD78RA>

Organizing Committee

Sen Chen, Nanyang Technological University

Sue Ann Chen, IBM

Jaejoon Lee, University of East Anglia

Xiao Ma, Beijing University of Posts and Telecommunications

Giovanni Quattrocchi, Politecnico di Milano

Jinjun Xiong (Chair), IBM

Ao Zhou, Beijing University of Posts and Telecommunications

Jia Zou, Arizona State University

2020 IEEE World Congress on Services Message from the Steering Committee Chair



Carl K. Chang
Iowa State University
Steering Committee
Chair

Welcome to the 2020 edition of The IEEE World Congress on Services. The Congress planners and organizers, volunteers and staff together have been working tirelessly for a full year now. We have overcome unexpected obstacles including the global pandemic, initial hesitation of submissions for fearing of the virus and travel bans by potential authors, and the overhead of the total virtualization of the Congress in the end. For the first time in 2019 we moved the entire Congress out of the United States to Milan, Italy, and enjoyed a great success. The original plan for 2020 was to continue the rotation pattern and move the Congress to the Asia Pacific region with Beijing as the primary host city. In March 2020 the Steering Committee decided to move the Congress date from July to October in anticipation that the pandemic would recede by then, and hopefully we could still hold it in a face-to-face fashion, although we also decided to provide attendees the remote-participation option. That plan did not materialize, and in May we finally decided to completely virtualize the Congress. We were fortunate to have come across Underline Science as an emerging virtual conferencing provider with help from the Computer Society staff. Underline is a relatively young organization, but one with great vision. This Congress event has

indeed presented a lot of challenges to this young company but in the end they have prevailed. We invite our audience to test out their services and the various features provided through their digital platform. We ask you to please return your feedback through the survey and if the feedback is very positive, we may continue to grow with Underline. Our long-range plan is to continue the rotation pattern between the Americas, Europe and Asia Pacific. As such, on behalf of the Steering Committee, I am pleased to announce that the 2021 IEEE World Congress on Services will be held in Chicago, USA tentatively scheduled from September 5-10, 2021 if the conditions allow us to do so, and it is very likely that the event may be arranged in a hybrid format with some live presentations and discussions with some interactions occurring remotely. Please mark your calendar accordingly, and check the Congress site often for the latest developments.

Allow me to reiterate a bit on “paper” logistics, established to make the planning and development activities much smoother. Since 2018 we have adopted an encoding method – the paper designator -- so that we can easily identify a paper. Paper designators include three parts: first, a 3-letter code designating the conference or an event such as a workshop; the second, a 3-letter code designating the paper category; and third, a paper ID number, which is generated when a paper is submitted to EasyChair. The paper ID is unique within each EasyChair submission site, however it is not unique for a complex organization like this Congress that where multiple EasyChair sites co-exist. I cannot over-emphasize the importance for all authors to always use the paper designator for all communications with the volunteers or the professional staff. It saves a lot of time and energy for us to identify a contributed paper. After all, most of us are volunteers, and should not spend so much time trying to identify a paper. Therefore, each author should conscientiously provide the correct paper designator in all communications – either with volunteers, staff, or in systems. We have also been using the double-blind review policy and provided an early submission opportunity for those who have papers ready for submission early, and are willing to receive early reviews to improve the probability of being accepted in the end. Indeed, under the leadership of Program Chairs-in-Chief Ernesto Damini and Zhi Jin, we continued the high standard for selecting only the best contributions and have composed a world-class technical program. In 2020, we recommended to five affiliated conferences a cross-the-board acceptance ratio of 20% for full/regular papers.

The Congress is a large and complex professional event, as you can see from the Organizing Committee page on the web. A large number of volunteers serve in various roles to make this event possible. In 2020, due to many unexpected situations including the pandemic, it became a whole-year long process before

Steering Committee

Elisa Bertino, Purdue University
Carl K. Chang, Iowa State University (Chair)
Rong N. Chang, IBM Research
Peter Chen, Carnegie Mellon University
Ernesto Damiani, University of Milan
Ian Foster, University of Chicago
Dennis Gannon, Indiana University
Frank Leymann, University of Stuttgart
Hong Mei, Beijing Institute of Technology
Stephen S. Yau, Arizona State University

we are able to present this edition of the SERVICES Congress, a definite high-impact professional event for the services computing industry. Last but not least, I regret to inform this community that Michael Goul, a Steering Committee member, passed away in March this year. Mike was a dear friend and colleague to many of us. We have missed him greatly!

To conclude, although we cannot physically meet in Beijing this year, we do hope that you can still enjoy the technical program and various interaction opportunities with the community in the digital format. It is also time to begin preparation to make contributions to the 2021 Congress. With some luck, we may see each other in Chicago next year.

IEEE 2020 World Congress on Services Welcome Message from Congress 2020 General Chairs



Hong Mei
Peking University
General Chair

Welcome to the 2020 IEEE World Congress on Services! Our economies are increasingly services-oriented and there are thus huge demands for innovative information technology to improve the quality and productivity of all kinds of services. The SERVICES Congress is the leading forum for presenting the most advanced results in services research and to exchange ideas among thought leaders, researchers, and practitioners.

This year's Congress is in many ways different from the previous editions. Due to the current health crisis, in May 2020, after a careful evaluation, the organization committee of the IEEE SERVICES Congress 2020 made a very difficult but necessary decision to transform most of events of the IEEE SERVICES Congress 2020 into an on-line format; the result is the on-line IEEE SERVICES Congress spanning the week of October 18-24, 2020. Only the opening ceremony of the IEEE SERVICES Congress 2020 takes place as an in-person one-day event on October 18 in Beijing, China. However, the on-line format and the Congress rescheduling from July to October have provided some nice opportunities. In addition to the initial deadline for paper submission (March 5, 2020), we were able to introduce a second deadline (June 5, 2020). These two deadlines combined with possibility for authors to resubmit revised versions of their papers have greatly enhanced the technical quality of the papers. Registration fees have also been greatly reduced and we hope that many of our colleagues in academia, industry and government will take advantage of these lower fees.



Elisa Bertino
Purdue University
General Chair

The core of this year's Congress consists of five affiliated conferences focusing on major aspects of services technologies: cloud computing, edge computing, smart data services, web services, and services computing.

The Congress also includes more than ten workshops and symposia focusing on specific and/or newly emerging topics. The Congress program is complemented by four tutorials and a Hackthon competition, the first in the history of IEEE SERVICES. Last but not least, the Congress includes a doctoral symposium to foster the future generation of researchers in the area of services.

The Congress includes six outstanding keynote speeches: (1) On Odor Reproduction, and How to Test For It by David Harel, a Vice President of the Israel Academy of Sciences and Humanities, (2) Cloud Native Database Systems for Enterprise Applications by Feifei Li, a Vice President of Alibaba Group, (3) On the Future of Smart Transportation with AI by Ozan Tonguz, a professor at Carnegie Mellon University, (4) Digital Health and Beyond: What Computing Can Do to Transform Health by Wendy Nilssen, a Program Director in the Computer and Information Science and Engineering Directorate at NSF, (5) IT Services after COVID-19 by Dr. Dong Xie, a CTO of IBM Greater China Group and Director of IBM China Research Lab, and (6) Smart Data Services for Sensemaking in Human-Centered Dynamic Systems by Selcuk Candan of Arizona State University. Please don't miss these exciting talks.

There are several plenary panels on important and hot topics such as Serviceology, Software Service Engineering and Its Ecosystem Evolution, Smart Data and Digital Health Services Beyond COVID-19, etc. Several symposia also have invited well-known experts to give invited speeches/papers or participate in panel discussions. Attending those sessions will increase your knowledge significantly.

This year CONGRESS has been made possible by the dedication and hard work of many talented volunteers and professional staff members (particularly, from the IEEE Computer Society and Peking

University). First and foremost, we would like to express our appreciation to the Steering Committee Chair Carl Chang. Without the vision, organization skills, and dedication of Carl, transforming a complex event like the IEEE SERVICES Congress would have been impossible. All our research community owns Carl “big thanks!!”. We also thank Stephen S. Yau and Peter Chen – Honorary General Chairs of the Congress – for their timely advices throughout the Congress organizational process.

The excellent Congress technical program was developed by the Congress Program Chairs-in-Chief Ernesto Damiani and Zhi Jin, who worked with the program chairs of the five affiliated conferences. The exciting program of symposia was created by the endless efforts of the Congress Symposia General Chair Rong N. Chang, and 12 General Chairs and 13 Program Chairs of the affiliated conferences. Furthermore, we would like to thank the IEEE Services Computing Technical Committee Chair Rong N. Chang, and the CCF Technical Committee on Services Computing Chair Jianwei Yin, for their tremendous support of the Congress.

More than 50 individuals have served as core volunteers in the Congress. Please visit the Organizing Committee roster to see the list of conference general chairs and program chairs, registration chairs, publicity Chairs, etc. They all have been working together very hard to make possible such as a large-scale virtual conference. Their work and their focus on the scientific quality and organizational aspects of the different events is key to a successful 2020 IEEE SERVICES Congress.

We would also like to thank our industry sponsors from Alibaba, Huawei, Baidu, Tencent, LIZHI and Jingdong for their strong support to make the Congress successful and to broaden the Congress visibility towards industry and practitioners.

It is really regretful that we cannot meet in person in Beijing, a very beautiful city, which is a rich testimony of the Chinese civilization over the centuries. Beijing is also a major information service hub throughout the world, which matches very well with the focus of our Congress. However, we definitely believe that our service technologies as well cooperation across the world will make possible in the future to prevent or detect very early societal disasters like the COVID-19 pandemics. Finally, we would like to share the spirit of classic song “Through the Rain” by the Cinderella Rock Band.

*I know it's hard
To turn the page
To walk the line
To have the faith
Drowning in your pain
But I know it's true
The sun shines through the rain
That in the end
We all find our way
World keeps turning
Nothing EVER changes*

IEEE 2020 World Congress on Services Message from the Program Chairs in Chief



Ernesto Damiani
University of Milan
Program Chair

It is our great pleasure to welcome you to the 2020 edition of the IEEE World Congress on Services. This year edition represents an important milestone as the Congress is held virtually, although preserving a strong organizational and scientific link to Beijing, where the Congress was scheduled to take place. The success of the Congress recognizes the strong research communities around the world that focus on foundations, systems, methodologies, and applications of computing-based services. This is a field that over the years has evolved and expanded to encompass new areas, including edge computing, IoT, and smart data services.

The Congress is now organized into five conferences, IEEE CLOUD 2020, IEEE EDGE 2020, IEEE ICWS 2020, IEEE SCC 2020 and IEEE SMDS 2020, which collectively however provide a comprehensive view of research advances as well novel applications and industry perspectives. To further broaden the perspective it offers to participants, the Congress includes several workshops on emerging research topics and symposia. The Congress has become the leading venue for whoever, from academia and industry, is interested in a multi-disciplinary view of the service computing field.



Zhi Jin
Peking University
Program Chair

In the line of the previous edition, the Congress conferences have all followed a rigorous scientific review process as result of which we have an excellent set of regular research papers. The program of each conference is complemented by invited papers by world-renowned researchers. As we believe that it is part of the Congress' mission to include early reports of novel ideas; for this reason, the program also includes short research papers highlighting promising preliminary research results..

Putting together the program of a federation of conferences like the Services Congress is a challenging task. We however have been very fortunate to have the collaboration of several colleagues. First, we would like to recognize the program co-chairs of the four conferences: Claudio Ardagna and Shangguang Wang (IEEE CLOUD 2020), Schahram Dustdar and Xiaodong Duan (IEEE EDGE 2020), Zhiyong Feng, and Elena Ferrari (IEEE ICWS 2020), Luciano Baresi, Jia Zhang, and Jianwei Yin (IEEE SCC 2020) Laurence Yang, Tevfik Kosar, and Hongbing Wang (IEEE SMDS 2020). They all recruited PC members with strong research tracks, and enforced our Congress' double-blind review policy. We would like to thank Katsunori Oyama, Senior Publication, Anxiang Ma, Vice Publication Chair and Zhongjie Wang, Publication Chair, who had the important task of coordinating the preparation of the Congress proceedings with the program chairs.

We are particularly grateful to Elisa Bertino, IEEE Services General Chair and our predecessor in the PCIC role, Carl Chang, Chair of the IEEE Services Steering Committee and Rong N. Chan, Chair of the Symposia Program, for their tireless work and advice. Finally, we would like to thank all the colleagues worldwide who submitted their best research work to our Congress. It is their work that makes the IEEE Services Congress a strong research forum.

We hope that the innovative online formula of the Congress will increase opportunities to network with other researchers and get interesting and novel directions for your research work. Enjoy the program!!

IEEE 2020 World Congress on Services

Message from the General Chair of Congress Symposia



Rong Chang
IBM Research
Symposia General
Chair

The Symposia program features insightful discussions among accomplished academic and industry leaders on emerging impactful R&D topics related to services. There are two kinds of symposia at IEEE World Congress on Services (SERVICES): congress-wide vs. within-conference. Congress-wide symposia, such as the one on digital health as a service, aim at attacking important services research challenges that are not specific to any affiliated conference of IEEE SERVICES. Moreover, a congress-wide symposium can target at a specific services community, e.g., doctoral students, women, education, vertical service professions, etc. A within-conference symposium focuses on shaping future R&D topics that are key to the impact and growth of conference. A symposium program is composed of distinguished speaker presentations, panels, and/or paper presentation sessions. Compared with conference papers, an IEEE SERVICES symposium paper can be an invited visionary/position/survey/experience manuscript.

IEEE SERVICES Symposia were held for the first time in 2019 with two inaugural congress-wide symposia: Symposium on Future of Financial Services (FFS) and Digital Health as a Services Symposium (DHAASS). Below is a summary of this year's Symposia program.

[CLOUD Symposium, within IEEE CLOUD](#)

This symposium features a panel titled "Serverless in a Distributed Cloud Continuum" and two sessions on edge-embedded cloud computing.

[Digital Health As A Service Symposium \(DHAAS\)](#)

DHAASS aims to bring together R&D leaders in digital health to share their research, practical experience, and visions of the future of sustainable health and social care transformations.

[Doctoral Symposium](#)

It offers services research PhD students a unique forum for getting visibility, feedback, and advice on their research activities and careers from other R&D leaders and student colleagues.

[IEEE Services Hackathon](#)

The inaugural event provides a transdisciplinary teamwork platform for students with diverse backgrounds to collaboratively realize innovative ideas in a timely manner under mentorship of experienced professionals.

[Industry Symposium](#)

It features two invited paper sessions and two panels, titled "Current and Future Trends of Education on Services Science and Engineering" and "Industrial Big Data: Opportunities and Challenges", respectively. Relevant within-conference symposium panels and paper sessions are cross-listed in the technical program.

[Symposium on Future of Financial Services \(FFS\), within IEEE SCC 2020](#)

Per the innovation needs of banking, insurance, and financial markets, this symposium aims to identify the R&D opportunities that are essential to successfully lead the digital future of financial services.

[Symposium on Women in Services Computing \(WISC\)](#)

The inaugural IEEE WISC Symposium evolves from the IEEE WISC Workshop. It features accomplished women speakers in academic and industry as well as an inaugural lighting talk session with cash awards.

Special thanks go to the organizing committee of IEEE SERVICES Symposia 2020, particularly all the General Chairs and Program Chairs. The COVID-19 pandemic has resulted in many unexpected time-consuming workload to them. On behalf of committee, we appreciate the on-demand support and help provided by the other IEEE SERVICES 2020 leaders. As a team, we have created the best symposia program for the IEEE SERVICES community.

Last, but not the least, I sincerely appreciate the foundational effort Michael Goul made in starting the Symposia program last year. I am honored to execute his will. I wish everyone find the Symposia inspiring and interesting.

IEEE 2020 World Congress on Services Welcome Message from Workshops Program Chairs



Bo Cheng
Beijing University of
Posts &
Telecommunications
Workshops Chair

Services 2020 has built on and expanded the workshops programme from prior instances of the conference; some topics covered in workshops have become mainstream (aspects around Big Data and Health for example), new topics have emerged and focus shifted as the year progressed.

The workshop programme for this conference expanded from 6 to 11 workshops, all attracting interesting papers for review and the final selection of papers will be presented in a number of workshop sessions.

The exciting workshops we have in this year's installment are:

- [2ND IEEE SERVICES WORKSHOP ON BIG DATA FOR PUBLIC HEALTH POLICY MAKING \(BIGPHP\)](#) to go beyond the frontier of today's public health policy making process by envisioning how to exploit the full potential of Big Data Analytics in ways compliant with the principles and needs of modern societies, like satisfying security and privacy requirements.
- [2ND IEEE SERVICES WORKSHOP ON KNOWLEDGE NETWORKS \(KN\)](#) to explore recent results and emerging work in the areas of Knowledge Graph, DIKW architecture and Knowledge Network.
- [THE 1ST IEEE SERVICES WORKSHOP ON CROSSOVER SERVICES \(IWCS\)](#) to promote the cross-enterprise, cross-field or cross-industry collaborations resulting in innovative business models, brand-new products, or services.
- [THE 2ND IEEE SERVICES WORKSHOP ON NETWORK SERVICES \(NS\)](#) to develop new insights into maintain quality of service (QoS) and quality of experience (QoE) based on behaviour of an end-to-end network service as the result of the combination of the individual network function behaviours as well as the behaviours of the network infrastructure composition mechanism.
- [THE 1ST IEEE SERVICES WORKSHOP ON ARTIFICIAL INTELLIGENCE AND SERVICES ADAPTION \(AISA\)](#) to explore theoretical models, adaptation processes, tools and evolution in intelligence services adaption.
- [THE 1ST IEEE SERVICES WORKSHOP ON THE SOFTWARE INTEGRATING COLLECTIVE SERVICE, INTELLIGENCE AND ECOSYSTEM \(COSINE\): A NEW SOFTWARE DEVELOPMENT METHODOLOGY AND ENVIRONMENT](#) to gather industry and academia with respect to the applications of services technology in integrated ecosystems.
- [THE 1ST IEEE SERVICES WORKSHOP ON DATA-CENTRIC WORKFLOWS ON HETEROGENEOUS INFRASTRUCTURES: CHALLENGES AND DIRECTIONS \(DAWHI\)](#) to establishing a platform exchanging the latest experience and research ideas on data-centric applications across heterogeneous infrastructures.
- [THE 1ST IEEE SERVICES WORKSHOP ON SATELLITE EDGE COMPUTING \(WSEC\)](#) to explore theory and technologies of satellite edge computing.
- [THE 2ND IEEE SERVICES WORKSHOP ON CYBER SECURITY AND RESILIENCE IN THE INTERNET OF THINGS \(CSRIOT\)](#) to explor novel ways of dealing with their vulnerabilities and mitigating sophisticated cyber-attacks.
- [THE 1ST IEEE SERVICES WORKSHOP ON FUTURE INTERNET OF THINGS SERVICES \(FIOTS\)](#) to showcase latest research in the IoT ecosystems with a focus on IoT Services.
- [THE 8TH IEEE SERVICES WORKSHOP ON SOFTWARE ENGINEERING FOR/IN THE CLOUD \(FORINC\)](#) to foster cross-fertilization of advances from software engineering, services and cloud computing.

We like to thank the chairs of each workshop for bringing these exciting areas of current interest into the format of workshops. We like to thank the programme committee members for the workshops for their significant efforts in turning reviews around swiftly but to high quality, providing authors with insights into possible improvements and with ideas for future directions of their work. We also thank the authors for contributing to the workshops. Finally, and ahead of the congress we like to thank the authors for presenting their work to the audience and we hope that participants at the congress will be gaining new inspiration from the work presented.

IEEE 2020 World Congress on Services

Message from the Technical Committee Chair on Services Computing of IEEE Computer Society



Rong Chang
IBM Research
TCSVC Chair

IEEE Computer Society (IEEE-CS) Technical Committee on Services Computing (TCSVC), <http://tab.computer.org/tcsvc>, has endorsed the affiliated technical conferences of IEEE World Congress on Services (SERVICES) since 2004. Over the past 16 years, IEEE-CS has provided 100% financial co-sponsorship for the annual events with the exception of 2014 to 2017 (during which, IEEE-CS provided 60% financial co-sponsorship). Many innovative growth initiatives have been delivered for the best interests of the worldwide services computing community, a fast-growing R&D community with more than 12,000 active participants. In terms of the total number of IEEE Xplore downloads, IEEE SERVICES is ranked in the top 5% in recent years.

For the past three years, IEEE-CS TCSVC has been working closely with the steering committee of IEEE SERVICES on metamorphosing the planning and execution of the annual technical conferences affiliated with IEEE SERVICES. Noteworthy changes include establishing IEEE compliant bylaws, institutionalizing a two-year conference planning process, and selecting non-US venues for IEEE SERVICES. Financial health of the annual events also enables IEEE-CS TCSVC to provide cash prizes in support of the [comprehensive awards program of IEEE SERVICES 2020](#). Despite various unexpected challenges (e.g., the COVID-19 pandemic), the transformation has been progressing well with contributions from many committed volunteer leaders. Besides the organizing committee of IEEE SERVICES 2020, I would like to thank all the members of the IEEE-CS TCSVC committees listed at the end of this message. They are pivotal to the services provided by IEEE-CS TCSVC.

Aiming at promoting women professionals and inspiring young researchers in services computing, IEEE-CS TCSVC established the “[Women in Services Computing Award](#)” and the “[Rising Star Award](#)” in 2018. Encouraging feedback on those two awards resulted in the creation of two TCSVC committees: “Women in Services Computing (WISC) Committee” and “Young Experts in Services Computing (YESC) Committee.” Your active participation in growing these two communities all over the world has been and will be appreciated. IEEE-CS TCSVC website has information on [free membership subscription](#) and [sponsored social media groups](#).

One important ongoing initiative of IEEE-CS TCSVC is advancing the scientific foundations for service science and engineering, making “services computing” or “serviceology” as a first-class discipline in academic and service verticals. The panels will be held at IEEE SERVICES 2020 on this subject: one of them is titled “[Serviceology: Advancing Scientific Foundations for Modern Digital Services](#)” and the other “[Current and Future Trends of Education on Services Science and Engineering](#)”. Your active participation in those two panels and your tangible contributions to follow-up actions would be rewarding.

Last, but not the least, I would like to openly appreciate the foundational effort Michael Goul made for the growth of the community of IEEE-CS TCSVC. I am honored to execute his will for this community. I wish everyone enjoy participating in IEEE SERVICES 2020.

Executive Committee of IEEE-CS TCSVC

Chair: Rong N. Chang, IBM Research

Executive Vice Chair: Gopal Pingali, IBM India

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Treasurer: Shiyong Lu, Wayne State University

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Andrzej M. Gosinski, Deakin University

Zakaria Maamar, Zayed University

Byungchul Tak, Kyungpook National University



2020 World Congress on SERVICES - Opening Remarks Leila De Floriani, 2020 IEEE Computer Society President Monday October 19, 01:00 UTC

Leila De Floriani is a professor at the University of Maryland, College Park, USA. She has previously been a professor at the University of Genova (Italy), and she has also held positions at the University of Nebraska, Rensselaer Polytechnic Institute, and the Italian National Research Council. De Floriani is the 2020 President of the IEEE Computer Society. She has been a member of the Board of Governors of the IEEE Computer Society (CS) since 2017. She is a Fellow of the IEEE, a Fellow of the International Association for Pattern Recognition, a Fellow of the Eurographics Association, and a Pioneer of the Solid Modeling Association. She is an IEEE Computer Society Golden Core Member and a member of the IEEE Honor Society IEEE-HKN.

She has been the editor-in-chief of the IEEE Transactions on Visualization and Computer Graphics (TVCG) from 2015-2018, and served as an associate editor for IEEE TVCG from 2004-2008. De Floriani is currently an associate editor of ACM Transactions on Spatial Algorithms and Systems, Geoinformatica, and Graphical Models. She has served on the program committees of over 150 leading international conferences, including several IEEE conferences, and has contributed to many conferences in a leadership capacity.

De Floriani has authored over 300 peer-reviewed scientific publications in data visualization, geospatial data representation and processing, computer graphics, geometric modeling, shape analysis and understanding, garnering several best paper awards and invitations as a keynote speaker. Her research has been funded by numerous national and international agencies, including the European Commission and the National Science Foundation.



Keynote
Cloud Native Database Systems for Enterprise Applications
Feifei Li, Alibaba Group

Monday, October 19
9:30-10:30AM China Standard Time
(1:30-2:30AM UTC)

Location: Juxian Hall, Friendship Hotel, Beijing

Abstract

Cloud native database becomes increasingly important for the era of cloud computing, due to the needs for elasticity and high availability. A cloud native database system leverages software-hardware co-design to explore accelerations offered by new hardware such as RDMA and NVM. New design architectures such as shared-storage and shared-everything enable a cloud-native database to decouple computation from storage and provide elasticity. For highly concurrent workloads that require horizontal scalability, a cloud native database can also leverage a shared-nothing layer to provide distributed query and transaction processing. Cloud applications also require that cloud native databases to offer high availability through distributed consensus protocols. Furthermore, the need for integrating big data processing workloads with a traditional OLAP data warehouse inside a cloud native database/data warehouse becomes increasingly imperative, so that the system can provide both real-time online interactive analytics and batched offline ETL with complex computation. We will present the key technical ideas towards building cloud native database systems and the application and integration and big data and AI techniques in such systems.

Brief Biography

Feifei Li is currently a Vice President of Alibaba Group, ACM Distinguished Scientist, President of the Database Products Business Unit of Alibaba Cloud Intelligence, and Director of the Database and Storage Lab of DAMO academy. He has won multiple awards from ACM and IEEE etc. He is a recipient of the ACM SoCC 2019 Best Paper Award (runner-up), IEEE ICDE 2014 10 Years Most Influential Paper Award, ACM SIGMOD 2016 Best Paper Award, ACM SIGMOD 2015 Best System Demonstration Award, IEEE ICDE 2004 Best Paper Award. He has been an associate editor, PC co-chairs, and core committee members for many prestigious journals and conferences, and has led the R&D efforts of cloud native database systems and products at Alibaba.



Keynote

On Odor Reproduction, and How to Test For It David Harel, Weizmann Institute of Science; Israel Academy of Sciences and Humanities Tuesday October 20, 12:00 - 14:00 UTC

Abstract: For years there has been interest in the possibility of building a reliable odor reproduction system (ORS), with its vast spectrum of applications: from e-commerce, games and video, via the food and cosmetics industry, to medical diagnosis. Such a system would enable an output device --- the whiffer --- to release an imitation of an odor read in by an input device --- the sniffer --- upon command. To realize this scheme, one must carry out deep and complex research that combines computer science and mathematics with chemistry, physics and biochemistry, and brain science with psychophysical work and human physiological experimentation. In the process, we expect a deep understanding of this least understood of our senses to emerge. I will discuss the feasibility of an ORS, and will also address the question (not unlike Turing's 1950 question about artificial intelligence) of how to test the validity of a candidate ORS, in face of the impossibility of naming odors in general, and despite the fact that such systems still being far from being viable. The importance and nontrivial nature of the question are discussed, and a novel testing method is proposed, which involves ideas from imitation and recognition, taking advantage of the availability of near-perfect reproduction methods for sight and sound.

Brief Biography

Prof. David Harel has been at the Weizmann Institute of Science since 1980, serving in the past as Dean of the Faculty of Mathematics and Computer Science. He is currently also Vice President of the Israel Academy of Sciences and Humanities. He has worked in logic and computability, software and systems engineering, modeling biological systems, odor reproduction, and more. He invented Statecharts and co-invented Live Sequence Charts. Among his books are "Algorithmics: The Spirit of Computing", "Computers Ltd.: What They Really Can't Do" and "Come, Let's Play: Scenario-Based Programming Using LSCs and the Play-Engine". His many awards include the ACM Karlstrom Outstanding Educator Award, the Israel Prize, the ACM Software System Award, the Eme"t Prize, and five honorary degrees. He is a Fellow of ACM, the IEEE, the AAAS and the EATCS, a member of the Academia Europaea and the Israel Academy of Sciences and Humanities, a foreign member of the US National Academy of Engineering, the American Academy of Arts and Sciences and the US National Academy of Sciences, and a Fellow of the Royal Society (FRS).



Keynote

On the Future of Smart Transportation with AI

Ozan Tonguz, Carnegie Mellon University

Wednesday October 21, 13:00 - 14:20 UTC

Abstract

In this talk we will discuss how the future of Intelligent Transportation Systems (ITS) is currently being shaped by some key technologies such as V2X, Cloud Computing, Machine Learning (ML) and Artificial Intelligence (AI). In this context, we will highlight the close relationship between the well-known current efforts on mitigating traffic congestion, enhancing traffic safety, and autonomous driving. Solving these complex problems will help the quest for building smart cities in many countries as well as solving the notorious traffic congestion problems in legacy cities, and large-scale deployment of autonomous vehicles (AV) for the general public. We will also consider how the Covid-19 pandemic might exacerbate some of these global problems that urgently need innovative solutions.

Brief Biography

Ozan K. Tonguz is a tenured Full Professor in the Department of Electrical and Computer Engineering at Carnegie Mellon University (CMU) and the Founder and CEO of CMU startup Virtual Traffic Lights, LLC (see details at www.virtualtrafficlights.com).

Prior to joining academia, he was with Bell Communications Research (Bellcore) doing research in optical networks and communication systems. His current research interests include artificial intelligence (AI), intelligent transportation systems, autonomous driving, distributed AI, machine learning, vehicle-to-vehicle (V2V) and V2X communications, vehicular networks, sensor networks, computer networks, wireless networks and communications systems, ad hoc wireless networks, self-organizing networks, smart grid, Internet of Things (IoT), optical communications and networks, and security. He has published more than 300 technical papers in IEEE journals and conference proceedings. He is an inventor on 21 patents (18 US patents and 3 international patents). He is well-known for his contributions to vehicular networks, wireless communications and networks, and optical communications and networks. He is the author (with G. Ferrari) of the 2006 Wiley book entitled "Ad Hoc Wireless Networks: A Communication-Theoretic Perspective".

He is the Founder and CEO of Virtual Traffic Lights (VTL), LLC, a CMU startup that was launched for providing solutions to several acute transportation problems related to safety and traffic information systems, using vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) wireless communications and distributed AI paradigms. His work and inventions on VTL has been featured in more than 100 countries in different continents by CNN, New Scientist, Discovery Channel, GizMag, CBS, AUDI Technology Magazine, The Atlantic, Metro World News, Eyewitness News in Johannesburg, South Africa, many radio and TV channels, and Internet media. His industrial experience includes periods with Bell Communications Research, General Motors (GM), Texas Instruments, Intel, Harris RF Communications, CTI Inc., Aria Wireless Systems, Clearwire Technologies, Nokia Networks, Nokia Research Center, Neuro Kinetics, and Asea Brown Boveri (ABB). He currently serves or has served as a consultant or expert for several companies, law firms, and government agencies in the USA, Europe, and Asia.



Keynote

Digital Health and Beyond: What Computing Can Do to Transform Health

Wendy Nilsen, Program Director, Smart & Connected Health; Information & Intelligent Systems, CISE Directorate, National Science Foundation

Wednesday October 21, 19:00 - 20:00 UTC

Abstract

Medicine and public health have, without consciously acknowledging it, have become a digital industry. Data from patient records, lab tests, images, mobile apps and the Internet of Things (IoT), have changed the information and interface for health. The novel coronavirus (COVID-19) has escalated a shift in care from providers to patients and from clinics to the home. With the proper safeguards, mobile technologies can now safely move diagnosis, treatment of chronic diseases, prevention efforts, and surveillance of infectious disease into the home and community. These changes provide many opportunities for computing and engineering to transform health. To make this happen, the technological and biomedical communities will need to partner in new ways in which safe and trustworthy technology can become a pillar of the healthcare team.

Brief Biography

Wendy Nilsen, Ph.D. is in the Program Director in the Computer and Information Science and Engineering Directorate at NSF. She is also the lead Program Director in the Smart and Connected Health program. Her work focuses on the intersection of computing and human functioning. Her interests span the areas of sensing, analytics, cyber-physical systems, information systems, machine learning, artificial intelligence and robotics. More specifically, her efforts include: serving as cochair of the Health Information Technology Research and Development working group of the Networking and Information Technology Research and Development Program; the lead for the NSF/NIH Smart and Connected Health announcement; convening workshops to address methodology in technology in health research; and, serving on numerous federal technology initiatives. Prior to joining NSF, Wendy was at the National Institutes of Health.



Keynote
IT Services after COVID-19
Dong Xie, CTO of IBM Greater China Group
Thursday October 22, 7:00 - 8:20 UTC

Abstract

The COVID-19 pandemic has made historical changes to human society. We need more research, collaboration, data and knowledge to cope with the immediate impact of COVID-19 and go beyond it. This speech will talk about the science, technology and innovation efforts to address COVID-19. And introduce and discuss the changes, new requirements and solutions for the IT services after COVID-19.

Brief Biography

Dr. Dong Xie is CTO of IBM Greater China Group, VP of IBM China Systems Lab, and Director of IBM China Research Lab. He is an experienced executive with a demonstrated history of working in the information technology and services industry. He is skillful in Enterprise Software, Enterprise Architecture, AI Engineering and Industry Solutions, IT Strategy, and R&D Management. He obtained a Ph.D. degree from Tsinghua University in 1996.



Keynote

Smart Data Services for Sensemaking in Human-Centered Dynamic Systems K. Selçuk Candan, Arizona State University Friday October 23, 19:00 - 20:20 UTC

Abstract

Many socio-economical critical human-centered domains (such as sustainability, public health, emergency management) are characterized by highly complex and dynamic systems, requiring data and model driven situational awareness and decision making. Successfully tackling many urgent challenges in these domains requires obtaining a deeper understanding of complex relationships and interactions among a diverse spectrum of entities in different evolving contexts. Models have to be constructed in the presence of sensed data, along with applicable physical models, from multiple sources, often characterized by varying levels of coverage and accuracy. Moreover, both data and models required for the said situational awareness and predictions are defined over high-dimensional and time-varying parameter spaces. Thus, smart data services in these domains necessitate addressing several major challenges, including latent contexts of impact, heterogeneous networks of entities, dynamicity of impact in varying contexts, and high computational and I/O costs of context-sensitive impact discovery. These algorithms and the novel data platforms they are deployed in need to be efficient and scalable in terms of off-line and on-line running times and their space requirements. In this talk, we will provide several examples from pandemic response and disaster planning, neurology, and resilient buildings and briefly discuss outlines of possible computational approaches to these smart data services.

Brief Biography

K. Selçuk Candan is a Professor of Computer Science and Engineering at the Arizona State University (ASU) and the Director of ASU's Center for Assured and Scalable Data Engineering (CASCADE). His primary research interest is in the area of management and analysis of non-traditional, heterogeneous, and imprecise (such as multimedia and scientific -- including epidemic) data. He has published over 230 journal and peer-reviewed conference articles, one book, and 16 book chapters. He has 9 patents. Prof. Candan served as an associate editor of for the Very Large Databases (VLDB) journal and IEEE Transactions on Multimedia. He is currently in the editorial boards of the ACM Transactions on Database Systems, IEEE Transactions on Knowledge and Data Engineering, and IEEE Transactions on Cloud Computing. He has served as general or program chair for many premier ACM and IEEE conferences, including ACM SIGMOD, ACM MM, ACM ICMR, IEEE IC2E, and most recently IEEE SMDS. He has successfully served as the PI or co-PI of numerous grants, including from the National Science Foundation, DOD, and DOE. His funded research on epidemics includes "epiDMS: Data Management and Analytics for Decision-Making From Epidemic Spread Simulation Ensembles," "Understanding the Evolution Patterns of the Ebola Outbreak in West-Africa and Supporting Real-Time Decision Making and Hypothesis Testing Through Large Scale Simulations," and "RTEM: Rapid Testing as Multi-fidelity Data Collection for Epidemic Modeling", the last of which is focusing on co-modelling of COVID-19 epidemic and testing strategies. He is a member of the Executive Committee of ACM SIGMOD and an ACM Distinguished Scientist. You can find more information about his research and an up-to-date resume at <http://aria.asu.edu/candan>.

Plenary Panel

Software Service Engineering and Its Ecosystem Evolution

Tuesday October 20, 14:40-16:00 UTC

Summary: As software services become ubiquitous in all industry domains and markets, agility-ability to quickly responding to changes, fast time to market, security, as well as cost reduction becomes the dominant constraints. Emerging application areas, such as intelligent medical applications, smart cities, cyber manufacturing and intelligent resources/energy management requires the development of services with self-awareness, self-adaption or auto-healing behaviors, with low human intervention. At the same time, the advances in artificial intelligence and machine learning techniques can be exploited to empower software and service engineers with intelligent software development tools and technologies. The novel software development and delivery practices (e.g., DevOps, DecSecOps, and more recently, AIOps, and ModelOps) and their related ecosystems are now becoming mainstream techniques. But are they enough? And how easily can their potential be exploited in big companies and in SMEs?

The panelists will discuss new developments and future challenges in this area from their perspective, by addressing the following issues (as well as others raised by the audience)

What are the strengths and weaknesses of existing approaches?

What do you view as the most important issues that need to be solved in the near future?

What are some key use-cases from industry and academic perspectives?



Panel Chair: Elena Ferrari, University of Insubria

Elena Ferrari is a full professor of Computer Science at the University of Insubria (Italy), where she leads the STRICT SocialLab. She received her Ph.D and M.Sc. degree in Computer Science from the University of Milano (Italy). Her research interests are in the broad area of cybersecurity, privacy, and trust. Current research includes security and privacy for Big Data and IoT, access control, machine learning for cybersecurity, risk analysis, blockchain, and secure social media. Prof. Ferrari has published several books and more than 240 papers in international journals and conference proceedings. She has received several awards, including the 2009 IEEE Technical Achievement Award, the ACM CODASPY Research Award, the ACM SACMAT 10 Year Test of Time Award, an IBM Faculty Award, and a Google Research Award. She is an ACM and IEEE Fellow.

Prof. Ferrari currently serves as associate editor in chief of IEEE Internet Computing. She is associate editor for the ACM Transactions on Data Science, IEEE Transactions on Services Computing, Data Science and Engineering, and the International Journal of Cooperative Information Systems. She is the chair of the steering committee of the ACM Symposium on Access Control Models and Technologies and has been the PC chair of several major conferences in the data management and security/privacy fields. She has also repeatedly served on the program committees of all major data management conferences.

Prof. Ferrari's has led several research projects in the field of cybersecurity and privacy, which have been funded by several companies and institutions (e.g., EU Commission, Google, IBM, EOARD/AFOSR, and the Italian Ministry for University and Research). In 2018, she has been named one of the 50 most influential Italian women in tech. More details can be found at <http://dawsec.dicom.uninsubria.it/elena.ferrari/>.



Panelist: Dinesh C. Verma, IBM TJ Watson Research Center

Dinesh C. Verma (IBM Fellow, Fellow of Royal Academy of Engineering, IEEE Fellow) leads the Distributed AI team at IBM TJ Watson Research Center, Yorktown Heights, New York. His current focus of research is AI enabled applications for 5G Edge environments and AI-enabled management of computer and telecommunications networks. He has more than 25 years of professional experience after his doctoral degree from UC Berkeley. He has authored ten books, 150+ technical papers and been granted 185+ U.S. patents. He has chaired/vice-chaired IEEE technical committee on computer communications, as well as IEEE Internet technical committee. He

has served on various program committees, editorial boards and managed large international multi-institutional government programs. He is a member of the IBM Academy of Technology, has been recognized multiple times as an IBM Master Inventor, won several IBM technical awards, including designation as an IBM Fellow, the highest technical recognition within the company. He has made seminal contributions to several areas in computer networks, including Quality of Service management in computer networks and Policy based Networking. He has contributed to several IBM products and service engagements including significant contributions to server networking stack, network management products and customer projects related to cellular network analytics. Currently, Dinesh is responsible for defining the IBM strategy in the area of edge computing for IBM world-wide research. He is the Principal Investigator for the International Technology Alliance in Distributed Analytics, a group of 15 academic, industrial and government research organizations in U.S. and UK looking at the challenges in analytics and cognitive computing tasks in a federated multi-organization environment. More details about Dinesh can be seen at <https://researcher.watson.ibm.com/researcher/view.php?person=us-dverma>



Panelist: Xiao Xue, Tianjin University

Xiao Xue is a professor with College of Intelligence and Computing, Tianjin University. His research interests include service computing, swarm intelligence, and computational experiments. In recent years, he has published a series of articles about the evolution analysis and intervention of service ecosystem, which has attracted widespread attention. In addition, he has just published a monograph “Computational Experimental Methods for Complex Systems” in China Science Publishing Press, which is considered by experts in the field to be the first book to systematically discuss computational experimental methods. Because of the above contribution, he has received two second class prizes of Provincial Natural Science Award (ranked first), and one first class prize of provincial natural science outstanding academic book (single author).

Until now, he has successively won the honorary titles of Provincial Outstanding Youth in Science and Technology Innovation, Provincial Science and Technology Innovation Talent, Provincial Academic Leader, Provincial Outstanding Master Thesis Instructor, etc. Currently, he is a member of IEEE, CCF, ACM; member of the Service Computing Committee; member of the Parallel Intelligence Committee; expert of the National Natural Science Foundation of China; TII, TSC, TKDE, IJPR, JIT, JNCA, SOCA, IEEE IoT and other international journal reviewers. He has been workshop Co-chair of ICSOC 2019, Publication Chair of ICSS 2019, PC member of ICWS 2018, 2019, 2020.



Panelist: Xin Peng, Fudan University

Xin Peng is Professor and deputy dean of School of Computer Science, at Fudan University, China. He received his PhD in Computer Science from Fudan University in 2006. He is deputy director of CCF (China Computer Federation) Technical Committee on Software Engineering and steering committee member of ICSME (International Conference on Software Maintenance and Evolution). He is Co-Editor-in-Chief of Journal of Software: Evolution and Process and on the editorial boards of Empirical Software Engineering and Chinese Journal of Software. He has been Program Co-Chair of ICSR 2019, Local Chair of ICSME 2017, Journal First Co-Chair of

ASE 2019, RENE Track Program Co-Chair of SCAM 2019, Industry Track Program Co-Chair of ICPC 2020. He is or has been on the program committees of reputable conferences in the area of software engineering (e.g., ICSE, FSE, ASE, ICSME, SANER, ICPC). He leads the CodeWisdom Team at Fudan University, which is targeting at developing intelligent software engineering techniques and tools for software development, maintenance, and operation. His research focuses on three aspects: software analytics and big data analysis for software development; intelligent software development by using AI technologies such as deep learning and knowledge graph; intelligent software technologies in mobile and cloud computing, including development and operation of microservice systems and situational composition of ubiquitous services. His work won the Best Paper Award of ICSM 2011, the ACM SIGSOFT Distinguished Paper Award of ASE 2018, the IEEE TCSE Distinguished Paper Award of ICSME 2018 and ICSME 2019, and IEEE Transactions on Software Engineering Best Paper award for 2018.



Panelist: Jia Zhang, Southern Methodist University

Jia Zhang is the Cruse C. and Marjorie F. Calahan Centennial Chair in Engineering, Professor of Department of Computer Science at Southern Methodist University. Her research interests emphasize the application of machine learning and information retrieval methods to tackle data science infrastructure problems, with a recent focus on scientific workflows, provenance mining, software discovery, knowledge graph, and interdisciplinary applications of all of these interests in the area of earth science. She has served as PI on grants worth over \$5 Million. Dr. Zhang has co-authored one textbook "Services Computing" and has published over 170 refereed journal papers,

book chapters, and conference papers. Her research won two Best Paper awards at IEEE SCC (2011, 2017), and three Best Student Paper awards at IEEE ICWS (2014, 2018) and IEEE ICCS (2018). She also holds three US patents. Dr. Zhang has served as an associated editor of the IEEE TSC since 2008. She serves as PC Chair for IEEE SCC 2020. She received the first IEEE TCSVC Outstanding Service Award in 2016. Dr. Zhang holds a Ph.D. in Computer Science from the University of Illinois at Chicago.

Plenary Panel

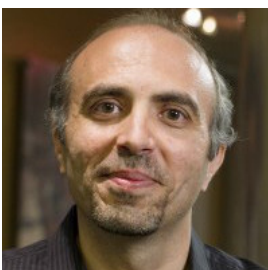
Smart Data and Digital Health Services Beyond COVID-19

Wednesday October 21, 14:40-16:00 UTC

Summary: Surpassing other epidemics and pandemics in recent memory, the COVID-19 pandemic is having an immense impact on population safety and a devastating effect on world economies and the livelihood of individuals and societies. The global-scale response to the pandemic triggered drastic measures including economic shutdowns, travel bans, stay-home orders, and even complete lockdowns of entire cities, regions, and countries. Obviously, any plan for stopping a pandemic of this scale must be based on a quantitative understanding of the proportion of the at-risk population that needs to be protected by effective control measures in order for transmission to decline sufficiently and quickly enough for the epidemic to end. However, scientific studies such as real-time and continuous analysis and decision making (including estimating transmissibility of the disease, forecasting the spatio-temporal spread at different spatial scales, assessing the effect of various controls, predicting the effect of school closures and reopening, assessing the impact of pharmaceutical interventions) through models and simulations require data driven services. Going beyond managing COVID-19 epidemic itself, equally urgent innovations are also needed in data driven services to effectively respond to a wide spectrum of societal and economical challenges caused by this pandemic.

Organized by the IEEE Conference on Smart Data Services (SMDS) and the IEEE Digital Health as a Service Symposium, this panel brings together academic, governmental and industrial experts in data science, computational epidemiology, security and privacy, and healthcare technologies to focus on the radical shifts needed in smart data and digital health services to respond to challenges posed by COVID-19 in the contexts of epidemiology (e.g., modeling, testing, vaccine development), health and human services (e.g., mixed home-work living, tele-health, uberization of health and social care services, and COVID-proof delivery of health and aging services), and families, communities and societies (e.g., remote education and online schooling, tele-work, privacy, governance, community resiliency).

After an introductory opening, each panelist will address one of the above mentioned responses to COVID-19 as well as future epidemics and pandemics through data science or other data-centric sciences and digital services.



Panel Chair: K. Selçuk Candan, Arizona State University

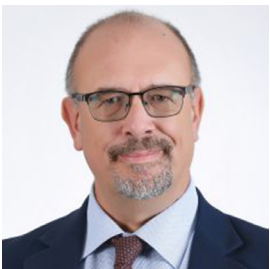
K. Selçuk Candan is a Professor of Computer Science and Engineering at the Arizona State University (ASU) and the Director of ASU's Center for Assured and Scalable Data Engineering (CASCADE). His primary research interest is in the area of management and analysis of non-traditional, heterogeneous, and imprecise (such as multimedia and scientific -- including epidemic) data. He has published over 230 journal and peer-

reviewed conference articles, one book, and 16 book chapters. He has 9 patents. Prof. Candan served as an associate editor of for the Very Large Databases (VLDB) journal and IEEE Transactions on Multimedia. He is currently in the editorial boards of the ACM Transactions on Database Systems, IEEE Transactions on Knowledge and Data Engineering, and IEEE Transactions on Cloud Computing. He has served as general or program chair for many premier ACM and IEEE conferences, including ACM SIGMOD, ACM MM, ACM ICMR, IEEE IC2E, and most recently IEEE SMDS. He has successfully served as the PI or co-PI of numerous grants, including from the National Science Foundation, DOD, and DOE. His funded research on epidemics includes "epiDMS: Data Management and Analytics for Decision-Making From Epidemic Spread Simulation Ensembles," "Understanding the Evolution Patterns of the Ebola Outbreak in West-Africa and Supporting Real-Time Decision Making and Hypothesis Testing Through Large Scale Simulations," and "RTEM: Rapid Testing as Multi-fidelity Data Collection for Epidemic Modeling", the last of which is focusing on co-modelling of COVID-19 epidemic and testing strategies. He is a member of the Executive Committee of ACM SIGMOD and an ACM Distinguished Scientist. You can find more information about his research and an up-to-date resume at <http://aria.asu.edu/candan>.



Panelist: Gerardo Chowell, Georgia State University

Dr. Gerardo Chowell is Professor of Epidemiology and Biostatistics in the School of Public Health at Georgia State University in Atlanta. He is also a Senior Research Fellow in the Division of International Epidemiology and Population Studies at the Fogarty International Center, NIH. Dr. Chowell has over 16 years of experience in studying infectious disease transmission dynamics and control by integrating diverse data sources with mathematical, statistical, and epidemiological methods. His interdisciplinary research approach includes the development, evaluation, and application of rigorous quantitative tools for investigating transmission mechanisms and generating evidence-based forecasts of the trajectory of evolving epidemics. He collaborates with scientists and public health officials around the world. For instance, during the 2009 A/H1N1 influenza pandemic, he collaborated with researchers and public health officials in Mexico to advise the Office of the President on the transmissibility, severity and control interventions associated with this pandemic. This work helped inform early public health policy. In the context of the ongoing COVID-19 pandemic, our work has shed light on key transmission and epidemiological features of the novel coronavirus. In particular, our work provided early evidence on the significant role of asymptomatic individuals in the transmission dynamics of SARS-CoV-2.



Panelist: Ernesto Damiani, Università degli Studi di Milano

Ernesto Damiani is Full Professor at Università degli Studi di Milano, Senior Director of Artificial Intelligence and Intelligent Systems Institute, Khalifa University, leader of the Big Data area at Etisalat British Telecom Innovation Center, and President of the Consortium of Italian Computer Science Universities (CINI). He is also part of the COVID-19 Research Task Force established in Khalifa University (UAE). According to DBLP (August 2020), Ernesto Damiani has authored 131 journal papers, 324 refereed articles in proceedings of international conferences, and published 56 books and chapters as an author or editor. According to Google Scholar, Ernesto's work has been cited more than 17,000 times and his h-index is 55; 278 of his papers have at least 10 citations. On Scopus he has 591 documents and more than 6,700 total citations by 5,300 documents. His Scopus h-index is 35. With 521 publications listed on DBLP, he is considered among the most prolific European computer scientists. His areas of interest include Artificial Intelligence, Machine Learning, Big Data Analytics, Edge/Cloud security and performance, and cyber-physical systems. He has been the Principal Investigator of the H2020 TOREADOR project on Big-Data-as-a-Service funded by the EU Commission on the ICT call on Big Data Research. Ernesto has been a recipient of the Stephen Yau Award from the Service Society, of the Outstanding contributions Award from IFIP TC2, of the Chester-Sall Award from IEEE IES, and of a doctorate honoris causa from INSA – Lyon (France) for his contribution to Big Data teaching and research.



Panelist: Murat Kantarcioglu, University of Texas at Dallas

Dr. Murat Kantarcioglu is a Professor in the Computer Science Department and Director of the Data Security and Privacy Lab at The University of Texas at Dallas (UTD). He received a PhD in Computer Science from Purdue University in 2005 where he received the Purdue CERIAS Diamond Award for Academic excellence. He is also a visiting scholar at Harvard Data Privacy Lab. Dr. Kantarcioglu's research focuses on the integration of cyber security, machine learning, data science and blockchains for creating technologies that can efficiently and securely store, analyze and share data and machine learning results.

He is a recipient of an NSF grant to investigate technologies to safeguard patient data during COVID-19 research.

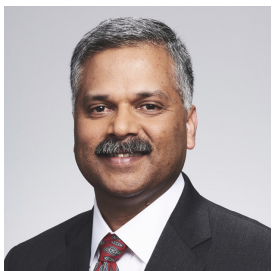
His research has been supported by grants including from NSF, AFOSR, ARO, ONR, NSA, and NIH. He has published over 170 peer reviewed papers in top tier venues such as ACM KDD, SIGMOD, ICDM, ICDE, PVLDB, NDSS, USENIX Security and several IEEE/ACM Transactions as well as served as program co-chair for conferences such as IEEE ICDE, ACM SACMAT, IEEE Cloud, ACM CODASPY. Some of his research work has been covered by the media outlets such as the Boston Globe, ABC News, PBS/KERA, DFW Television, and has received multiple best paper awards. He is the recipient of various awards including NSF CAREER award, the AMIA (American Medical Informatics Association) 2014 Homer R Warner Award and the IEEE ISI (Intelligence and Security Informatics) 2017 Technical Achievement Award presented jointly by IEEE SMC and IEEE ITS societies for his research in data security and privacy. He is also a Distinguished Scientist of ACM.



Panelist: Balakrishnan Prabhakaran, National Science Foundation (NSF)

Prabha (Balakrishnan) Prabhakaran is currently a Program Director in the Human Centered Computing (HCC) program of Information and Intelligent Systems (IIS) Division of the CISE (Computer and Information Science and Engineering) Directorate of the National Science Foundation (NSF). He is also involved with Secure and Trustworthy Computing as well as other programs such as Fairness in Artificial Intelligence, Future of Work.

Prabhakaran is a Professor in the faculty of Computer Science Department, University of Texas at Dallas. Dr. Prabhakaran received the prestigious NSF CAREER Award FY 2003 for his proposal on Animation Databases. He was selected as an ACM Distinguished Scientist in 2011 and is currently an IEEE Senior Member. He is an Associate Editor of IEEE Transactions on Multimedia. He is Member of the Editorial board of Multimedia Systems Journal (Springer), Multimedia Tools and Applications journal (Springer), and other multimedia systems journals. He received the Best Associate Editor for 2015, from Springer's Multimedia Systems Journal. Dr Prabhakaran is a Member of the Executive Council of the ACM Special Interest Group on Multimedia (SIGMM) and is the Co-Chair of IEEE Technical Committee on Multimedia Computing (TCMC) Special Interest Group on Video Analytics (SIGVA). Dr. Prabhakaran served the General Co-Chair of the IEEE International Conference on Health Informatics (ICHI) 2015. He was also a General Co-Chair of ACM International Conference on Multimedia Retrieval 2013 (ICMR 2013), IEEE Haptic, Audio, and Visual Environments (HAVE) 2014, a General Co-chair of ACM Multimedia 2011, and ACM Multimedia and Security (MM&Sec) 2007. Prof Prabhakaran's research has been funded by Federal Agencies such as the National Science Foundation (NSF), USA Army Research Office (ARO), and the US-IGNITE Program, apart from industries and consortiums.



Panelist: Ajay Royyuru, IBM Research

Ajay Royyuru leads Healthcare & Life Sciences research at IBM. His team is actively pursuing high quality science, developing novel technologies and achieving translational insights across this industry, including areas of cancer, cardiac, neurological, mental health, immune system, and infectious diseases. He co-leads the accelerated science effort in IBM's response to COVID-19. After his undergraduate and masters education in human biology and biophysics from All India Institute of Medical Sciences, New Delhi, Ajay obtained his Ph. D. in molecular biology from Tata Institute of Fundamental Research, Mumbai. He had postdoctoral training at Memorial Sloan-Kettering Cancer Center, New York and a brief stint at scientific software development before joining IBM Research. In 2016 Ajay was named an IBM Fellow, the company's pre-eminent technical distinction. Ajay is a member of International Society for Computational Biology, IBM Academy of Technology and IBM Industry Academy.

Plenary Panel

The Future of Home, Office, School in the Age of Pandemic

Wednesday October 21, 20:00-20:40 UTC

Summary:

The COVID-19 pandemic is impacting nearly all aspects of our daily lives: living, working, learning, entertaining, adventuring, and even our moments of happiness and grieving. Most especially our traditional lifestyles on all their variations are being challenged and forced to change. Our living environments - residences, offices, schools, and healthcare clinics and hospitals - have changed dramatically to cope with the Coronavirus and protect our lives and the lives of those around us. We must be prepared to change in order to save ourselves from this and future pandemics. We have learned from this and past pandemics that social distancing, hand washing, mask wearing are simple but essential rules that must be followed. But how can technology help in enforcement, adherence, awareness and acceptability of such rules? And how can technology empower and assist individuals, families, school children, college students, communities, small business owners, and large enterprise cope with radical changes in lifestyle? Perhaps, critically important are vulnerable groups including older adults, individuals with special needs, and those living with long term conditions; how can technology include an equitable support for those groups often facing limited access to technology and its potential benefits.

This panel aims to explore different approaches to new realities and requirements in environmental design of home, work and school, and community and societal level health and safety adaptations. The panel will seek to identify key challenges ahead of humanity and how computing technologies can help. It is expected that the audience will challenge the panelists for their wisdom in defining the new norm of lifestyles and obstacles that must be overcome.

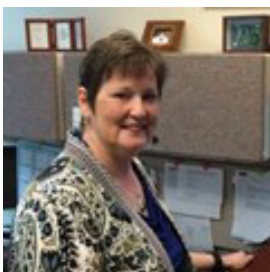
The panel chair will give a brief introduction to the panel objective and panelists. Panelists will take turns to share brief opening remarks with the audience. Then, the audience will be invited to interact with the panel to ask questions, or offer their own experiences, opinions and insights.



Panel Chair: Sheikh Iqbal Ahamed, Marquette University

Sheikh Iqbal Ahamed is a professor and Chair of Computer Science and director of Ubicomp lab at Marquette University, USA. He is a senior member of the IEEE, ACM, and the IEEE Computer Society. He completed his Ph.D. in Computer Science from Arizona State University, USA in 2003. His research interests include mHealth, affective computing, non-intrusive technologies. He is active in system and application development of mHealth projects for Native American, Hispanic community and other underserved populations like Nepal, Bangladesh. Most of his mHealth projects are supported by NIH, Industry and Philanthropic organizations.

He has published 200+ peer reviewed journal, conference and workshop papers. He has received twelve best paper/posters awards in last five years. Dr. Ahamed serves regularly on international conference program committees in software engineering and pervasive computing such as COMPSAC, PERCOM and SAC. He has been serving as the Standing Committee Vice Chair of IEEE COMPSAC(compsac.org), which is a signature conference of IEEE since 2015. He is the Guest Editor of Computer Communications Journal, Elsevier.



Panelist: Wendy Nilsen, National Science Foundation

Wendy Nilsen, Ph.D. is in the Program Director in the Computer and Information Science and Engineering Directorate at NSF. She is also the lead Program Director in the Smart and Connected Health program. Her work focuses on the intersection of computing and human functioning. Her interests span the areas of sensing, analytics, cyber-physical systems, information systems, machine learning, artificial intelligence and robotics. More specifically, her efforts include: serving as cochair of the Health Information Technology Research and Development working group of the Networking and Information Technology Research and Development Program;

the lead for the NSF/NIH Smart and Connected Health announcement; convening workshops to address

methodology in technology in health research; and, serving on numerous federal technology initiatives. Prior to joining NSF, Wendy was at the National Institutes of Health.



Panelist: Cheng-Chung (William) Chu, Tunghai University

William Cheng-Chung Chu received the M.S. and Ph.D. degrees in computer science from Northwestern University, Evanston, IL, USA, in 1987 and 1989, respectively. He is currently a Distinguished Professor with the Department of Computer Science, Tunghai University, Taichung, Taiwan, where he had served as the Director of Software Engineering and Technologies Center from 2004 to 2016 and as the Dean of Research and Development office from 2004 to 2007. From 1994 to 1998, he was the Dean of Engineering College and an Associate Professor with the Department of Information Engineering and Computer Science, Feng Chia University. He was a Research Scientist with the Software Technology Center, Lockheed Missiles and Space Company, Inc. In 1992, he was also a Visiting Scholar with Stanford University. He has edited several books and authored or coauthored more than 100 referred papers and book chapters, as well as participated in many international activities, including organizing international conferences, serving as the steering committee for the IEEE Computer Society Signature Conference on Computers, Software and Applications, the Asia-Pacific Software Engineering Conference, the IEEE International Conference on Software Quality, Reliability and Security, the International Symposium on System and Software Reliability, and the program committee of more than 70 international conferences. His current research interests include software engineering artificial intelligence and big data analytics. Prof. Chu was the recipient of special contribution awards in both 1992 and 1993 and a PIP Award in 1993 at Lockheed Missiles and Space Company, Inc. He is an Associate Editor for the IEEE TRANSACTIONS ON RELIABILITY, the Journal of Software Maintenance and Evolution, the International Journal of Advancements in Computing Technology, and the Journal of Systems and Software.



Panelist: Hemant Jain, The University of Tennessee-Chatanooga

Hemant Jain is W. Max Finely Chair in Business, Free Enterprise and Capitalism and professor of Data Analytics, in Gary W. Rollins College of Business at University of Tennessee Chattanooga. His areas of interest are Business Analytics, Text Mining and Machine Learning, Big Data Management, Healthcare IT and Service Oriented Architecture. His work has appeared in leading journals including Information Systems Research, MIS Quarterly, IEEE Transactions on Software Engineering, Journal of MIS, IEEE Transactions on Systems Man and Cybernetics, Naval Research Quarterly, Decision Sciences, Decision Support Systems, Communications of ACM, and Information & Management. He received IEEE Technical Committee on Service Computing Outstanding Leadership Award. He is a member of Steering Committee for IEEE Transactions on Big Data. He is co-editing a Special Issue of Information Systems Research on Humans, Algorithms, and Augmented Intelligence: The Future of Work, Organizations, and Society. He served as Associate Editor-in-Chief of IEEE Transactions on Services Computing and Associate Editor of Journal of AIS. He received his Ph. D. in information system from Lehigh University, a Master of Technology from Indian Institute of Technology, Kharagpur, India and Bachelor of Engineering from University of Indore, India.



Panelist: Michael Zimmer, Marquette University

Michael Zimmer, PhD, is an associate professor in the Department of Computer Science at Marquette University, where he also serves as the Director of Undergraduate Studies, Co-Director of the Interdisciplinary Data Science major, and Director of the Graduate Data Science Certificate. With a multidisciplinary background in communication & Internet studies, science & technology studies, and information policy & ethics, Dr. Zimmer studies the social and ethical dimensions of our contemporary digital ecosystem, with particular interest in digital privacy, data ethics, internet research ethics, and how users understand information flows within and across digital platforms. His research agenda has included investigations into web search engines, social media platforms, wearable fitness trackers, intelligent personal assistants, library technologies, autonomous vehicles, and other emerging technologies. Dr. Zimmer has engaged in research supported by the National Science Foundation, the National Institute of Health, and the Institute of Museum and Library Services.



Panelist: Kathy Chang, University of New Mexico and Engeye

Kathy Z. Chang is an Associate Residency Program Director and Assistant Clinical Professor in the Department of Family and Community Medicine at the University of New Mexico, USA. She is the current President of the Board of Directors for Engeye, Inc., a 501(c)3 non-profit organization supporting Engeye Health Clinic and the Engeye Scholars program in rural Uganda. She is a member of the Society of Teachers of Family Medicine and the current Communications Chair for the Global Health Educators Collaborative. She completed her M.D. and residency in Family Medicine at the University of Illinois College of Medicine in Peoria, IL, her M.P.H. in

population and community health through the University of Illinois at Chicago School of Public Health, and is a Fellow of the American Academy of Family Physicians. Her current clinical practice includes outpatient primary care and inpatient hospital coverage on the family medicine teaching service, including precepting residents and medical students. Her interests include global health equity, practice management, electronic medical record optimization, and she serves as the Clinical Documentation Improvement (CDI) department champion. Her work with Engeye includes development and ongoing maintenance of the open source electronic medical record system (OCEMR) used on site since 2011, serving on-site as the Director of Clinical Services from 2011-2013, and implementation of ongoing clinical education via messaging apps and now teleconferencing platforms.

Plenary Panel

Serviceology: Advancing Scientific Foundations for Modern Digital Services Thursday October 22, 8:40-10:00 UTC

Summary: Enterprises, industries, and entire economies are accelerating their shift to the evolving digital world. Real world systems, be it business, IT, and physical infrastructures, are rapidly converging as part of such a digital fabric and consumed as transdisciplinary modern services. The primary objective of this plenary panel is to draw the spotlight on the scientific foundations that are critical to modern services and digital platforms. More specifically, IEEE Computer Society started her services computing initiative about 20 years ago in light of the importance of creating a new computing discipline for the fast-growing service industry as well as computing professionals. In 2007, IBM and several top Chinese universities coined the term services science, management and engineering (SSME) aiming to promote science-based services R&D as a first-class research domain. In the 2009 book titled Knowledge Body of Serviceology for Universities, serviceology is defined as a discipline or specialty that focuses on laws, knowledge, technologies, and management of services; comprising of service science for investigating scientific laws and theories of services, service engineering for advancing service implementation and service solutioning technologies, and service management for pursuing business and operation management excellence of services. Unique characteristics of serviceology are transdisciplinary in nature, comprehensive in scope, and forward-looking in service-oriented consumption and delivery of functional capabilities with quality assurances. Although many computing technologies advocating novel services have enabled the delivery of many innovative as-a-service applications and solutions, much more theoretical and experimental research is needed for advancing the scientific foundations of serviceology.



Panel Chair: Kumar Bhaskaran, IBM Research, TJ Watson Research Center

Kumar Bhaskaran is a research scientist in IBM Research and is the global lead for the Governance of Science and Technology. His current areas of focus are in Brain-Machine Interfaces and the associated Neuro Data and Technology, Data Security and Privacy, and Climate Responsibility. Prior to that he was the global leader for Financial Services Research. He has 30+ years of experience in leading R&D teams world-wide. As the Head of Research in Singapore and the Chief Research Strategist for IBM in the Growth Markets he was responsible for creating the first public-private partnership on Blockchain innovations. He has a PhD from Rensselaer Polytechnic

Institute. He is a general chair of the 2020 IEEE International Conference on Services Computing and the honorary general chair of IEEE Symposium on Future of Financial Services. More details on Kumar can be seen [here](#).



Panel Chair: Xiaofei Xu, Harbin Institute of Technology

Xiaofei Xu has been a professor of computer science at Harbin Institute of Technology (HIT) since 1993. He is currently the vice president of Harbin Institute of Technology, and the president of HIT, Weihai campus. He received his Ph.D. Degree in HIT in 1988. His research interests include service computing and service engineering, enterprise computing and enterprise interoperability, software engineering, databases and data mining. He is the author/co-author of more than 300 journal/conference papers, and seven books. He has supervised more than 30 Ph.D. in computer science. He is a fellow and board-member of China Computer Federation (CCF), vice director of the Steering Committee of Higher Education on Software Engineering of China, and vice chair of China association of MOOC on computer education. He is also the leader of the expert group of University-Industry Co-education Program of China Ministry of Education. He was the chair of the Technical Committee on Service Computing of CCF. He is involved in the editorial boards of ten journals. He has been chair/co-chair of conferences, program committees in more than twenty international conferences, including IEEE SCC, ICSS, IESA, CEISEE. He received IEEE TCSVC Outstanding Leadership Award in 2019 and is a general chair of 2020 IEEE International Conference on Services Computing.



Panelist: Carl K. Chang, Iowa State University

Carl K. Chang is Professor of Computer Science, Professor of Human Computer Interaction and Director of Software Engineering Laboratory in the Department of Computer Science at Iowa State University where he served as its department chair from 2002-2013. He received a PhD in computer science from Northwestern University. He worked for GTE Automatic Electric and Bell Laboratories before joining the University of Illinois at Chicago in 1984, where he directed the International Center for Software Engineering. He served as Professor and Director for the Institute for Mobile, Pervasive, and Agile Computing Technologies (IMPACT) at Auburn University from 2001–2002, before moving to Iowa State University in July 2002. Chang was the 2004 IEEE Computer Society president. Previously he served as the Editor-in-Chief for IEEE Software (1991–1994) and Editor-in-Chief for IEEE Computer (2007–2010). He spearheaded the Computing Curricula 2001 (CC2001) project jointly sponsored by the IEEE Computer Society, the ACM, and the National Science Foundation. He is a Life Fellow of IEEE, a Fellow of AAAS, and a member and an officer of the European Academy of Sciences. He received the 2000 IEEE Third Millennium Medal, the 2006 Bulgaria Academy of Sciences Marin Drinov Medal, and the 2012 IEEE Computer Society Richard E. Merwin Medal. As a three times winner of IBM Faculty Award, Chang's research interests include software engineering, human computer interaction and digital health. He is the founder of Situation Analytics based on his Situ theoretical framework.



Panelist: Rong N. Chang, IBM Research, TJ Watson Research Center

Rong N. Chang is with IBM Research, T.J. Watson Research Center. He is a member of IBM Academy of Technology and chair of IBM Research Services PIC (Professional Interest Community). He is leading an in-market R&D effort in creating a composable enterprise microservices fabric for intelligent computing infrastructures. He received his Ph.D. degree in computer science & engineering from the University of Michigan at Ann Arbor in 1990. He has won one IEEE Best Paper Award, received six IBM corporate-level Outstanding Technical Achievement Awards, held 30+ patents, and published 50+ refereed technical papers in the areas of distributed services computing. He is chair of IEEE Technical Committee on Services Computing, associate editor-in-chief of the IEEE Transactions on Services Computing, and a distinguished member of ACM. He is a steering committee member of IEEE World Congress on Services (SERVICES) and an advisory committee member of CCF Technical Committee on Service Computing. He is general chair of 2020 IEEE SERVICES Symposia.



Panelist: Bhavani Thursaisingham, University of Texas at Dallas

Dr. Bhavani Thursaisingham is the Founders Chair Professor of Computer Science and the Executive Director of the Cyber Security Research and Education Institute at the University of Texas at Dallas (UTD). She is also a visiting Senior Research Fellow at Kings College, University of London and an elected Fellow of the ACM, IEEE, the AAAS, the NAI and the BCS. She was a Cyber Security Policy Fellow at the New America Foundation in 2017-8. Her research interests are on integrating cyber security and artificial intelligence/data science for the past 35 years (it used to be computer security and data management/mining/expert systems). She has

received several awards including the IEEE CS 1997 Technical Achievement Award, ACM SIGSAC 2010 Outstanding Contributions Award, the IEEE Comsoc Communications and Information Security 2019 Technical Recognition Award, the IEEE CS Services Computing 2017 Research Innovation Award, the ACM CODASPY 2017 Lasting Research Award, the IEEE ISI 2010 Research Leadership Award, the 2017 Dallas Business Journal Women in Technology Award, and the ACM SACMAT 10 Year Test of Time Awards for 2018 and 2019 (for papers published in 2008 and 2009). She co-chaired the Women in Cyber Security Conference (WiCyS) in 2016 and delivered the featured address at the 2018 Women in Data Science (WiDS) at Stanford University as well as keynote addresses at Cyber-W 2017 and 2020 (Women in Cyber Security Research), 2019 Women in Communications Engineering (WICE), and 2018 Women in Services Computing, and serves as the Co-Director of both the Women in Cyber Security and Women in Data Science Centers at UTD. Her 40-year career includes industry (Control Data, Honeywell), federal research laboratory (MITRE), US government (NSF) and US Academia. Her work has resulted in 130+ journal articles, 300+ conference papers, 150+ keynote and featured addresses, six US patents, fifteen books as well as technology transfer of the research to commercial products and operational systems. She received her PhD from the University of Wales, Swansea, UK, and the prestigious earned higher doctorate (D. Eng) from the University of Bristol, UK.

Plenary Panel

Opportunities for Data Analytics/Machine Learning Service in the Era of Covid-19

Friday October 23, 20:40-22:00 UTC

Summary: The Covid-19 pandemic is a global health crisis which is disrupting the world as we speak by devastating human lives and economic activities. The pandemic has impeded different sectors in every country including agriculture, education, healthcare, manufacturing, sports, and transportation. At the same time, the rapid spread of the virus is engendering a data deluge, which could play a major role in minimizing the impact of the pandemic. These data are generated from contact traces, statistical data such as, number of cases, recoveries, and deaths in a region, scanned medical images, data social media data. It is imperative that the data is managed and utilized properly and securely to gain crucial information about the pandemic.

The widespread adoption of machine learning (ML) and artificial intelligence (AI) techniques on many data science applications over the past few years has caused a revolution for scientific advances across multiple disciplines. One of the vital concerns in the data service community nowadays is the security and privacy of data, especially in the healthcare sector. However, the recent emergence of federated learning (FL) has the potential to challenge the data privacy issues with a secure model and data sharing techniques. Using different ML, AI, and FL approaches on the pandemic data, it is possible to figure out necessary prevention and treatment procedures as well as draw inference on the impact of the pandemic.

This panel will address the challenges and opportunities of using various secure data analysis techniques from ML and FL during the pandemic and post-pandemic era. Particularly, it will discuss the effect of data analytics techniques on pandemic related data and the inferred knowledge from these techniques, which will help us make progress against the pandemic.



Panel Chair: Latifur Khan, University of Texas at Dallas

Dr. Latifur Khan is currently a full Professor (tenured) in the Computer Science department at the University of Texas at Dallas, USA where he has been teaching and conducting research since September 2000. He received his Ph.D. degree in Computer Science from the University of Southern California (USC) in August of 2000. Dr. Khan is an ACM Distinguished Scientist and received IEEE Big Data Security Senior Research Award, in May 2019, and Fellow of SIRI (Society of Information Reuse and Integration) award in Aug, 2018. He has received prestigious awards including the IEEE Technical Achievement Award for Intelligence and Security Informatics and

IBM Faculty Award (research) 2016. Dr. Latifur Khan has published over 300 papers in premier journals

and in prestigious conferences. He has been invited to give keynotes and invited talks at a number of conferences hosted by IEEE and ACM. In addition, he has conducted tutorial sessions in prominent conferences such as SIGKDD 2017, 2016, IJCAI 2017, AAAI 2017, and ACM WWW 2005. Currently, Dr. Khan's research area focuses on big data management and analytics, data mining and its application over cyber security, complex data management including geo-spatial data and multimedia data. His research has been supported by grants from NSF, the Air Force Office of Scientific Research (AFOSR), DOE, NSA, IBM and HPE. More details can be found at: www.utdallas.edu/~lkhan/



Panelist: Elisa Bertino, Purdue University

Elisa Bertino is professor of Computer Science at Purdue University. She serves as Director of the Purdue Cyberspace Security Lab (Cyber2Slab). Prior to joining Purdue, she was a professor and department head at the Department of Computer Science and Communication of the University of Milan. She has been a visiting researcher at the IBM Research Laboratory in San Jose (now Almaden), at the Microelectronics and Computer Technology Corporation, at Rutgers University, at Telcordia Technologies. She has also held visiting professor positions at the Singapore National University and the Singapore Management University. Her main research interests include security, privacy, database systems, distributed systems, and sensor networks. Her recent research focuses on cybersecurity and privacy of cellular networks and IoT systems, and on edge analytics for cybersecurity. Elisa Bertino is a Fellow member of IEEE, ACM, and AAAS. She received the 2002 IEEE Computer Society Technical Achievement Award for "For outstanding contributions to database systems and database security and advanced data management systems", the 2005 IEEE Computer Society Tsutomu Kanai Award for "Pioneering and innovative research contributions to secure distributed systems", and the 2019-2020 ACM Athena Lecturer Award.



Panelist: Sharat Israni, University of California at San Francisco

Sharat Israni is Executive Director, CTO and Adjunct Faculty at UCSF's Bakar Computational Health Sciences Institute, which is building UCSF's next-gen research computing capability. Previously, he was Executive Director, Data Science, at Stanford Medicine. A long-serving Technology executive, Sharat's teams pioneered the use of "Big Data." He served as VP of Data at Yahoo! (1999-2008) and Intuit (2010-13), which pioneered "Big" Data Science and the use of Machine Learning to reinvent their products. He led Digital Media systems for broadcast/interactive TV at Silicon Graphics; and Data teams at IBM and HP. Sharat has been PI for NSF, NIH and RCUK workshops on Data Science topics in Biomedicine, and is a frequent peer-reviewer for several journals and conferences.



Panelist: Ling Liu, Georgia Institute of Technology

Dr. Ling Liu is a Professor in the School of Computer Science at Georgia Institute of Technology. She directs the research programs in the Distributed Data Intensive Systems Lab (DiSL), examining various aspects of large scale big data-powered artificial intelligence (AI) systems, and machine learning (ML) algorithms and analytics, including performance, availability, privacy, security and trust. Prof. Liu is an elected IEEE Fellow, a recipient of IEEE Computer Society Technical Achievement Award (2012), and a recipient of the best paper award from numerous top venues, including IEEE ICDCS, WWW, ACM/IEEE CCGrid, IEEE Cloud, IEEE ICWS. Prof. Liu served on editorial board of over a dozen international journals, including the editor in chief of IEEE Transactions on Service Computing (2013-2016) and currently, the editor in chief of ACM Transactions on Internet Computing (TOIT). Prof. Liu has been given invited keynote speeches in many top tier venues in Big Data, AI and ML systems and applications, Cloud Computing, Services Computing, Privacy, Security and Trust. Her current research is primarily supported by USA National Science Foundation under CISE programs and IBM.



Panelist: Ying Ding, University of Texas at Austin

Dr. Ying Ding is Bill & Lewis Suit Professor at School of Information, University of Texas at Austin. Before that, she was a professor and director of graduate studies for data science program at School of Informatics, Computing, and Engineering at Indiana University. She has led the effort to develop the online data science graduate

program for Indiana University. She also worked as a senior researcher at Department of Computer Science, University of Innsbruck (Austria) and Free University of Amsterdam (the Netherlands). She has been involved in various NIH, NSF and European-Union funded projects. She has published 240+ papers in journals, conferences, and workshops, and served as the program committee member for 200+ international conferences. She is the co-editor of book series called Semantic Web Synthesis by Morgan & Claypool publisher, the co-editor-in-chief for Data Intelligence published by MIT Press and Chinese Academy of Sciences, and serves as the editorial board member for several top journals in Information Science and Semantic Web. She is the co-founder of Data2Discovery company advancing cutting edge AI technologies in drug discovery and healthcare. Her current research interests include data-driven science of science, AI in healthcare, Semantic Web, knowledge graph, data science, scholarly communication, and the application of Web technologies.

IEEE 2020 World Congress on Services Welcome Message from the Women in Services Computing Symposium Chair



Lorraine Herger
IBM Research
TJ Watson Research
Center
WISC General Chair

The world is a very different place today from what it was a year ago, when we convened for the 2019 IEEE World Congress on Services in beautiful Milan, Italy. No one could have predicted the enormous shift the entire world has undergone in a few short months. However, we continue forward, using our innovative minds and hearts to utilize our best digital technologies, to collaborate across the miles and across all the time zones of the world.

The Symposium on Women in Services Computing (WISC) will be held in two sessions (October 19 and October 21, 2020), allowing participation from around the globe. We will hear from two distinguished speakers, take a look back at the history of the symposium since its inception in 2017 as the WISC workshop, and have a lively panel discussion with several colleagues from both academia and industry.

New this year will be our lightning talks, over one hour period, that will allow four participants to share their views on several thought-provoking and timely subjects. Please consider signing up for a lightning talk when you register for the symposium at the URL below. We will also be awarding a \$300USD award to the best lightning talk, at the end of the symposium.

https://forms.office.com/Pages/ResponsePage.aspx?id=DQSIkWdsW0yxEjajBLZtrQAAAAAAAAAAAAAO__f1L-WhUQTg2WDBOWEgyWkNI RFRDSUNKR1FKNU1EUC4u

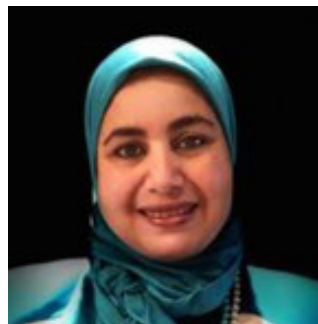
I would like to express my thanks the Symposium Steering Committee, and the Symposium Program Co-Chairs who have devoted significant time to organizing this event to meet the challenges of our times.



Mari Abe
IBM Tokyo
Program Chair



Wendy Chong
IBM Research, NY
Program Chair



Kaoutar El Maghaouri
IBM Research, NY
Program Chair



Vaijayanthi B. Desai
IBM GTS,
Bangalore
Program Chair

Symposium on Women in Services Computing (WISC)

The inaugural IEEE Symposium on Women in Services Computing (WISC) features academic and industrial speakers, and panelists. These speakers will weave their technical agendas into their personal journeys on becoming experts in their chosen field. The Symposium evolves from the IEEE WISC Workshop held since 2017. Every WISC Workshop convened at the annual IEEE SERVICES event to afford women, and all those who interested and passionate to create a gender-neutral environment in services computing, the opportunity to meet together, exchange views, and network.

Monday 10/19, 11:00 - 12:00

WISC Symposium I

Session Chair: Lorraine Herger, IBM Research, TJ Watson Research Center

Opening Welcome from the General Chair

Lorraine Herger, IBM Research, TJ Watson Research Center

Reflections on the History of IEEE SERVICES and the WISC Community

Jia Zhang, Southern Methodist University

Presentation and acceptance speech of the 2020 IEEE TCSVC WISC Awardee

Rong Chang, IBM Research, TJ Watson Research Center



Monday 10/19, 12:00 - 13:00

WISC Symposium II

Session Chair: Vajyanthi Desai, IBM Global Delivery Services, Bangalore

Accelerating the Journey to Cloud with AI

Gargi Dasgupta, Lab Director
IBM Research, India

Abstract: In this speech, Gargi will share with audience the opportunities in front of us as part of the cloud and digital transformation, and the role of AI in enabling that transformation as well as enable new breed of applications on top. She will also share her thoughts on how fundamental breakthroughs in AI Research will be needed as we address some of the core problems of cloud computing.

Bio: Gargi B. Dasgupta is the Director for IBM Research in India and the CTO for IBM India/South Asia. In her role as Director, Gargi is responsible for establishing and executing the technical agenda of IBM's India Research Lab in collaboration with IBM's worldwide research labs and business units. In her role as CTO, Gargi is responsible for representing and communicating IBM's overall technical vision & strategy with key stakeholders across the India/South Asia ecosystem -from developers and start-ups to key clients, analysts, media, and industry experts. Prior to this role Gargi was the Senior Manager at IBM Research-India leading the work in AI for Automation driving both deep technology innovations and real impact into IBM's enterprise solutions. Gargi serves as a strategist for IBM Research, working closely with IBM's Hybrid Cloud business and global services businesses to take innovative solutions to clients across the globe. She helped establish new research directions at the intersection of service science, text analytics, and AI. Gargi has been with IBM since 2004 when she joined as a Research Staff Member. In 2019, Gargi was recognized as one of IBM's Distinguished Engineer for her exemplary technological achievements. Gargi is an ACM Distinguished Speaker and an alumnus of Jadavpur University, Kolkata and University of Maryland, Baltimore County.

Monday 10/19, 13:00 - 14:00

WISC Symposium III

Panel Discussion

Panel Chair: Kaoutar El Magraoui, IBM Research, TJ Watson Research Center



Zhi Jin, Professor of Peking University

Zhi Jin is a professor of Computer Science at Peking University and the deputy director of Key Lab of High Confidence Software Technologies (MoE) at Peking University. Her research work is primarily concerned with requirements engineering and knowledge-based software engineering. Recently, she pays more attentions on the modeling of self-adaptive systems. She is/was principle investigator of over 15 national competitive grants including the chief scientist of a national basic research project (973 project) of the MoST of China and the project leader of three key projects of NSF China. She is co-author of four books and author/co-author over 150 journal

and conference publications. She serves for IEEE RE 2016, KSEM 2010 as General Chair, IEEE SERVICES 2020 as Program co-Chair in Chief, as well as IEEE COMPSAC 2011 and KSEM2009 as Program co-Chair. She is executive editor-in-chief of Chinese Journal of Software (2013-), Associate Editor of IEEE TSE (2018-) and IEEE TR (2019-). She also serves in the Editorial Board of JCST (2010-),REJ (2014-) and EMSE(2020-). She is ACM member, IEEE Senior Member, ISPMA Fellow and CCF Fellow.



Jing Fan, Professor of Zhejiang University of Technology

Jing Fan is a Professor of School of Computer Science and Technology, and Director of Institute of Computer Software at Zhejiang University of Technology, China. She received her B.S., M.S. and Ph.D. degree in Computer Science from Zhejiang University, China. She is a member of China Computer Federation (CCF) Council, Outstanding Member of CCF, and Executive Member of CCF Technical Committee on Service Computing (CCF TCSC). Her research interest includes Business Process Management, Intelligent Service Matching, Data Analysis and Visualization. Prof. Fan has published more than 100 papers in journals and conference proceedings.

She has been PC Chair of CCF NCSC 2016, General Chair of CBPM 2016, PC Vice-Chair of IEEE SOCA 2017, and PC Chair of IEEE SOCA 2018. She serves as PC Chair for IEEE ICWS 2020.



Frances West, Former Chief Accessibility Officer, IBM CEO, FrancesWestCo

Frances West is an internationally recognized thought leader, speaker, strategy advisor, and women-in-technology executive known for her work in innovation, technology, and business transformation. Her human-first approach to leadership and focus on digital inclusion come from her journey as a first-generation, non-English speaking immigrant and her career as a technology executive including IBM's first Chief Accessibility Officer. Frances is an appointed faculty instructor at the University of Massachusetts Medical School and holds an honorary doctorate

from the University of Massachusetts in Boston in recognition of her work in accessibility, research, and digital inclusion. She is author of "Authentic Inclusion™ Drives Disruptive Innovation" and founder of FrancesWestCo, a global strategy advisory company focused on operationalizing inclusion as a business and technology imperative.



Houda Elmimouni, Graduate student of Drexel University

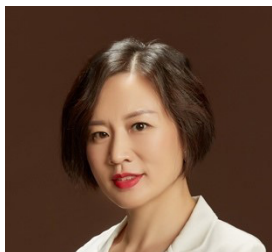
I am a doctoral candidate at Drexel University's College of Computing and Informatics, advised by Andrea Forte. My research interests are centered around human-computer interaction and computer-mediated communication. I seek to understand how humans use technology to communicate and how culture and gender influence such use. I also study to what extent designs align with social values and how to make the process of design a value sensitive one. I am a mother of two, striving continuously to strike a balance between family and academic lives.

Linkedin: <https://www.linkedin.com/in/houdaelmimouni/>

Wednesday 10/21, 11:00 - 12:00

WISC Symposium IV

Session Chair: Kaoutar El Maghraoui, IBM Research, TJ Watson Research Center



Digital Transformation of Industrial Companies in China

Wei Lu, Founder and CEO of K2Data

Abstract: In this speech, Dr. Wei Lu will share with audience the challenges industrial companies in China are facing and why digital transformation is essential, and several typical digital transformation use cases conducted with leading industrial companies in industries such as energy & utilities, electronics, steel manufacturing. She will also share the underlining technologies used and technical challenges addressed. Besides the work conducted by her company, Dr. Lu will share her learning in the journey of founding a tech startup as well.

Bio: Dr. Wei Lu is founder and CEO of K2Data. K2Data is a technology company focusing on using big data and AI to help industrial companies in their digital transformation journey. Customers of K2Data include leading industrial companies in China, such as GoldWind, State Grid, Petro China, SDLG, PAN Steel. K2Data was named "Technology Pioneer" by World Economy Forum in 2020. Before founding K2Data, Dr. Lu was a technology executive responsible for the middleware and cloud technologies research in IBM Research - China, with a focus on cloud service for data driven solutions.

Wednesday 10/21, 12:00 - 13:00

WISC Symposium V

Lightning Talks

Session Chair: Mari Abe, IBM Cloud and Cognitive Software

What are the 2-3 New Emerging Areas of New Industries in Services Computing that You Believe Will Be Most Important/Impactful?

Shubhi Asthana, Research Sr. Software Engineer of IBM Almaden Research Center

How Has COVID-19 Changed Your Personal and/or Professional Life and How Do You Maintain Mental and Physical Health?

Lin Liu, Professor of Tsinghua University

What Are the 2-3 New Emerging Areas of New Industries in Services that You Believe Will be Most Important/Impactful?

Zhi Jin, Professor of Peking University

What Life Advice Would You Offer to Your Younger Self, if You Could Go Back in Time?

Yanmei Zhang, Professor of Information School, Central University of Finance & Economics

Industry Symposium

Thursday October 22, 01:00-02:20 UTC Industry Panel 1

Current and Future Trends of Education on Services Science and Engineering

Summary:

Services science and engineering have been playing pivotal roles in the fast growing economy in many countries while the world is entering the era of "Internet + Services + Society and Economics". It is imperative to cultivate a large number of high-quality services science and engineering professionals through multi-disciplinary education. IEEE Computer Society initiated the world congress on services 16 years ago, and fully developed the World Congress on Services to include both the research and technology as well as the educational aspects of services. Industry had also recognized the importance of services, and a number of major IT corporations launched initiatives in this area. For example, IBM initiated a global education program on service science, management and engineering in 2005, and with several top Chinese universities coined the term serviceology focusing on the new discipline of services science and engineering. To date, many inter-disciplinary services-related academic programs with various degrees in China have been created and taught with industrial partners, and established cooperation, such as course development, textbook writing, students internships, joint R&D, studies, and sharing of real datasets.

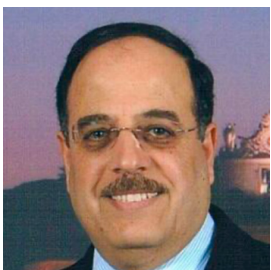
This panel will present the current state of the education programs and activities in the services science and engineering, and then focus on possible effective approaches to upgrading this important arena during the current dynamic environments, especially with the major impact of global pandemic. This panel will also address the following issues: What role should the industries and governments play in collaboration with the academia to strengthen services science and engineering education to meet the future needs of the society? What transformations are essential in the curriculum and the learning experience to attract more students to pursue services science and engineering? How can we increase the inter-disciplinary diversity in services sciences and engineering disciplines?



Panel Chair: Stephen Yau, Arizona State University

Stephen S. Yau is Professor of Computer Science and Engineering at Arizona State University (ASU), USA since 1994. He served as the chair of the Department of Computer Science and Engineering in 1994 - 2001, and later as the director of Information Assurance Center at ASU. Previously, he was on the faculties of Northwestern University, Evanston, Illinois, and University of Florida, Gainesville. He served as the president of the IEEE Computer Society and the editor-in-chief of IEEE COMPUTER magazine. He also served as the president of the American Federation of Information Processing Societies. He organized many major conferences, including the 1989 World Computer Congress sponsored by the International Federation for Information Processing, and the 2018

IEEE World Congress on Services. His current research includes services computing, cybersecurity, software engineering, IoT and blockchain. He has received many awards and recognitions, including the Tsutomu Kanai Award and Richard E. Merwin Award of the IEEE Computer Society, and the Outstanding Contributions Award of the Chinese Computer Federation. He is a Fellow of the IEEE and the American Association for the Advancement of Science. He received the Ph.D. degree from the University of Illinois, Urbana, in electrical engineering.



Panelist: Naguib Attia, IBM Global Universities Program

Naguib Attia is a Distinguished Engineer and VP of IBM Global University Programs. He is responsible for setting up IBM academic relations strategy, creating next generation global technical training programs in collaboration with universities, research institutions, and manage the overall award programs budgets. Previously, he was the VP& CTO of IBM Middle East and Africa (MEA). He was responsible for inventing and leading technical solutions for MEA as well as leading the Africa Skills Initiative. With over 25 years of industrial, manufacturing, research and academic

experience, he has contributed to shape the development of IBM's intellectual capital, industry insights, and overall solution portfolio for IBM. His specializations include Cloud, Business Analytics, Security, and Supply Chain optimization. He has a rich academic background with assignments from Chair, Computer Science Departments of Johnson C. Smith University, Charlotte, NC, The American University in Cairo, Egypt and University of Essex, England. He has actively published papers in different journals and has presented keynote addresses at many international conferences. He was the chair of Aerospace Industry Association Technical group. He holds a Ph.D. in Computer Science from the University of Essex, England.



Panelist: Ying Chen, Huike Research

Ying Chen is Chief Strategy Officer (CSO) of Huike Group and president of Huike Research, China, where he is in charge of group R&D innovation development. He is an expert and pioneer practitioner in industry-university collaboration. He has been guest professor at several top universities in China, He is CCF distinguished member. He co-authored four books on cloud computing and published over 60 papers in international journals and conference proceedings. He has more than 40 patents issued or being filed worldwide. He has served on the program committee and/or as co-chairs of various international conferences. Previously he was the associate

director and chief scientist of cloud computing at IBM Research – China, He was on IBM global research strategy team of software and service defining and executing the research strategy. He received B.S. and Ph.D. both in computer science, from Southeast University in 1994 and 1999.



Panelist: Xiaofei Xu, Harbin Institute of Technology

Xiaofei Xu has been a professor of computer science at Harbin Institute of Technology (HIT). China, since 1993. He is currently the vice president of Harbin Institute of Technology, and the president of HIT, Weihai campus. He received his Ph.D. Degree in HIT in 1988. His research interests include service computing and service engineering, enterprise computing and enterprise interoperability, software engineering, databases and data mining. He is the author/co-author of more than 300 journal/conference papers, and seven books. He has supervised more than 30 Ph.D. in computer science. He is a fellow and board-member of China Computer

Federation (CCF), vice director of the Steering Committee of Higher Education on Software Engineering of China, vice chair of China Association of MOOC on Computer Education, and vice chair of the Association of Industry-University-Research on IT-Related New Engineering in China. He is also the leader of the expert group of University-Industry Co-education Program of China Ministry of Education (MoE). He was a member of the MoE-IBM expert group of serviceology. He has created the early educational programs and courses on services science and engineering in China. He received IEEE TCSVC Outstanding Leadership Award in 2019 and is a general chair of 2020 IEEE International Conference on Services Computing.



Panelist: Jia Zhang, Southern Methodist University

Jia Zhang is the Cruse C. and Marjorie F. Calahan Centennial Chair in Engineering, Professor of Department of Computer Science at Southern Methodist University, Dallas, USA. She was on the faculties of Carnegie Mellon University - Silicon Valley, Northern Illinois University, and Nanjing University, China, and worked in industry as a software architect. Her research interests center around data science infrastructure, with a recent focus on scientific workflows, provenance mining, software discovery, knowledge graph, and their interdisciplinary applications. Her research is well funded by various government agencies. She co-authored a textbook "Services Computing"

published by Springer in 2007 and has more than 170 refereed journal and conference papers and book chapters. Her research won several best paper awards, and yielded three US patents. She served as an associate editor of IEEE Transactions on Services Computing, and has been in various leadership roles in international conferences, including a program chair of 2020 IEEE International Conference on Services Computing. She received the first IEEE TCSVC Outstanding Service Award in 2016. She holds the Ph.D. degree in Computer Science from the University of Illinois at Chicago.

Thursday October 22, 02:40-04:00 UTC

Industry Panel 2: Industrial Big Data: Opportunities and Challenges

Summary:

Big data technologies are pivotal to the ongoing service-oriented digital modernization of global industries such as automotive, manufacturing, and the emerging crossover industries led by data-driven companies Alibaba Group, Amazon, Tencent, etc. Industrial big data technologies promise many impact-making opportunities in the areas of intelligent e-commerce, auto-driving, and intelligent voice. However, it is challenging to capture the opportunities because they demand transdisciplinary collaboration in large as well. For instance, it is still an open issue on how to cost-effectively exploit industrial big data to facilitate making agile decisions in business, possessing competitive business intelligence, and/or delivering contextual knowledge services in realtime. This panel will have in-depth factual discussions about the opportunities and challenges of industrial big data from the viewpoint of intelligent service creators.



Panel Chair: Min Fu, LIZHI Inc.

Dr. Min Fu is a vice president from LIZHI Inc. Prior to joining LIZHI Inc., Dr. Fu was an AI group leader from Alibaba Group. Dr. Fu also holds an honorary fellowship position with Macquarie University, Australia (MQU). Dr. Fu obtained his PhD from the University of New South Wales, Australia (UNSW). After completing his PhD, Dr. Fu worked as a post-doc researcher in the Commonwealth Scientific and Industrial Research Organization, Australia (CSIRO). Dr. Fu used to be a researcher with MQU and a visiting scientist with CSIRO. He once served as the industry chair for ICSOC 2018, and obtained the "Outstanding Service Award" for his great devotion to the program of this conference. He was in the committees of over 5 international conferences (e.g. CloudCom 2020). Dr. Fu has over 35 publications in top international conferences, journals and book chapters, including DSN, ICSE, ICSOC, SPE and TDSC, etc. Dr. Fu has totally 5 years' research experience and 6 years' industry experience. His research interests include: big data analytics, data mining, machine learning, cloud computing, cyber security and software engineering.



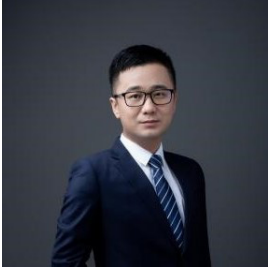
Panelist: Seongwoon Kim, Hyundai MN Soft

Dr. Seongwoon Kim is CTO and head of research center in Hyundai MNSoft which is a subsidiary company of Hyundai Motors Group. Among many accomplishments, it is worth noting his current leadership in the development of high definition maps for automated driving vehicles. He successfully applied intelligent pattern recognition technologies building High Definition Maps at the commercial level. Prior to joining Hyundai MNSoft, he was a vice president and head of software development group at Imaging Business in Samsung Electronics. He is a proven innovator with more than 25 years of experience in the field of Computer Science, specializing in image processing using computational intelligence. Moreover, Dr. Kim has been a prolific contributor to the intellectual community, reflected in more than 30 scientific papers and patents with over 500 citations, and participation in the global organization and Program Committee in multiple events in the area of intelligent signal processing. Dr. Kim holds a Ph.D. in Computer Science from the University of Illinois at Chicago.



Panelist: Wei Lu, K2Data

Dr. Wei Lu is founder and CEO of K2Data, a technology company focusing on using big data and AI to help industrial companies in their digital transformation journey. Customers of K2Data include leading industrial companies in China, such as GoldWind, State Grid, Petro China, SDLG, PAN Steel. K2Data was named "Technology Pioneer" by World Economy Forum in 2020. Before founding K2Data, Dr. Lu was a technology executive responsible for the middleware and cloud technologies research in IBM Research - China, with a focus on cloud service for data driven solutions.



Panelist: Qiang Qu, Huawei Cloud Blockchain Lab

Dr. Qiang Qu is the director of Huawei Cloud Blockchain Lab, a professor and the director of Guangdong Provincial R&D Center of Blockchain and Distributed IoT Security at Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences. He received his Ph.D. at Aarhus University. His current research interests are in data-intensive systems, focusing on efficient and scalable algorithm design, blockchain, and data sense-making.



Panelist: Wei Sun, Volkswagen Group

Dr. Wei Sun is now leading the research and development of smart mobility technologies and offerings empowered by electric vehicle, autonomous driving and AI technologies in Volkswagen Group China. Dr. Sun used to be Research technical executive of IBM Research – China leading Internet of Things research initiative across IBM global research labs. In recent years, Dr. Sun has been driving research projects in the areas of asset management, connected vehicle, transportation research, smarter city, connected vehicle services through partnership with partners and clients in selected industries. Dr. Sun was a member of IBM Academy of Technology, and he was also a member of IBM Academy Leadership Team.



Panelist: Haris Volos, DENSO Silicon Valley Innovation Center

Dr. Haris Volos is currently a Senior Research Engineer at DENSO's Silicon Valley Innovation Center in San Jose, USA. His focus is big data and edge computing applications based on driving data which include data collection, analysis, algorithm and application development. Dr. Volos previously had research faculty positions at the University of Arizona and Virginia Tech where he worked on machine learning techniques for wireless communications. Dr. Volos received his Ph.D. in Electrical Engineering from Virginia Tech in 2010. He is the co-author of at least 40 peer reviewed publications (most of them IEEE), holds 6 patents, and received several paper and research awards.



Panelist: Qianwen Zhou, LIZHI Inc.

Ms. Qianwen Zhou is a senior AI manager from LIZHI Inc. She holds both a B.F.A in Art History and a B.B.M in Business Management from Tsinghua University (THU). Ms. Qianwen Zhou is an expert in big data and AI applications. She has many years' experience on how big data and AI techniques can be applied in industries, such as Internet of Vehicles (IoV) and recommender systems. Her research areas include big data analytics, machine learning and artificial intelligence, and her work focuses on how AI applications can improve daily life and how to make proper product design for AI applications.

Thursday 10/22, 13:00 - 14:20

Industry Symposium - Session 3

Session Chair: Mengwei Xu, Beijing University of Posts & Telecommunications

Talk 1: Enabling Scalable and Secured Data Analytics for Blockchain Service
Qiang Qu, Research Director, Huawei



Dr. Qiang Qu is the director of Huawei Cloud Blockchain Lab, a professor and the director of Guangdong Provincial R&D Center of Blockchain and Distributed IoT Security at Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences. He received his Ph.D. at Aarhus University. His current research interests are in data-intensive systems, focusing on efficient and scalable algorithm design, blockchain, and data sense-making.

Talk 2: Application of Deep Reinforcement Learning in Control Optimization of Thermal Power Plants

Xianyuan Zhan, Data Scientist & Senior Researcher, JD Digits & JD Intelligent Cities Research



Dr. Xianyuan Zhan is a data scientist at JD Digits, he is also a senior researcher at JD Intelligent City Research. Dr. Zhan currently leads the research and development of AI-driven industrial system optimization products at JD iCity. He received a dual master's degree in computer and transportation engineering and a PhD degree in transportation engineering from Purdue University. Before joining JD, Dr. Zhan was a researcher at Microsoft Research Asia. He has published more than 30 papers in key journals and conferences in the field of transportation engineering and computer science. He is also a reviewer for many top transportation and computer science journals and conferences. He is currently a member of China Computer

Federation-Artificial intelligence & Pattern Recognition Committee. His main research areas include deep reinforcement learning, urban computing and intelligent transportation systems.

Thursday 10/22, 14:40 - 16:00 **Industry Symposium - Session 4** **Session Chair: Min Fu, LIZHI Inc.**

Talk 1: Accelerate Industrial Digitization with a Cloud-Edge Integrated IoT Platform

Leding Li, Chief Architect, Baidu



Mr. Leding Li is Principal Architect of Baidu Cloud IoT and also serves as member of Linux Foundation Edge Technical Advisory Council. Mr. Li joined Baidu in 2010, and is responsible for architecture and development of platform focused around Edge computing, 5G and Internet of Things, and the owner of open source edge computing framework called Baetyl. In his previous roles at Baidu, he was the lead architect for Baidu Open Search, and has worked extensively on the SOA framework of both Spider and Indexer of Baidu Search. Mr. Li was also an early participant in introducing machine learning to web mining.

Talk 2: Edge Container Service Design in Tencent Cloud

Xuan Jia, Research Manager, Tencent



Mr. Xuan Jia is a senior manager in Tencent Cloud, and he is also a CNCF ambassador. Mr. Jia is studying for Master's degree in Automation in Tsinghua University. Mr. Jia has more than 10 years' working experience in cloud computing and virtualization. He is familiar with 5G core network system and ETSI NFV MEC standardization. Before joining in Tencent company, Mr. Jia worked in China Mobile Institute Company, RedHat and H3C. His previous research work in China Mobile mainly focused on 5G edge computing.

Tutorial 1: Tsinghua Dataway: The Software Stack for AIOT Data Applications

Monday October 19, 02:40 - 03:40 UTC

Speaker: Jianmin Wang, Tsinghua University

Summary: This tutorial will give attendees hands-on experience in building an AIoT data application and deploying it as a service using the Tsinghua Dataway Software Stack. An overview of Dataway framework will be presented in advance of the hands-on exercise, including the major components in the software stack, and how they work together. Attendees will build a simple data application using interactive data model-driven application Development techniques. Then we will introduce the alternative deployment options. The tutorial starts with lectures and end with lab hands-on exercise. Attendees will come away with a good understanding of how data-intensive software is delivered using Dataway tools and practices with an interactive development framework that is easily composable.



Jianmin Wang is Professor of Tsinghua University, is the dean of School of Software, Vice Dean of School of Information Science and Technology, Tsinghua University. He serves the National Engineering Laboratory for Big Data Software as an executive director and leads the Beijing Key Laboratory of Industrial Big Data System and Applications. His research interests include industrial big data, big data software engineering, business process management and product lifecycle management. He received the 2nd Prizes of the National Science-Technology Advance Award of China in 1998 and 2014.

Tutorial 2: Augmented Reality and Virtual Reality Services in 5G Era

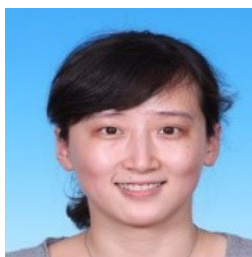
Monday October 19, 7:00 - 10:00 UTC

Speakers: Xiuquan Qiao, Beijing University of Posts & Telecommunications; Lei Yang, China Mobile Research Institute; Yansheng Fu, Pico Technology, Inc.; Wei Lyu, Nreal

Summary: This tutorial is to provide attendees the basic concepts of the Augmented Reality (AR) and Virtual Reality (VR). We will present an overview of the opportunities and challenges that AR/VR technologies are facing nowadays while 5G commercial usage rapidly grows from the academic and industry perspectives, and provide some AR and VR applications or demos. The attendees of this tutorial can expect to know the essential facts about AR/VR market trends and technology development as well as what contribution 5G and Cloud will make to AR/VR products. We invite the academic researchers and industrial experts from BUPT, China Mobile Research Institute, Pico and Nreal to share more details of 5G+AR/VR solution to commercial scenarios. Finally, we will discuss the significant obstacles and challenges 5G+AR/VR faces in current stage.



Xiuquan Qiao is Professor with the Beijing University of Posts and Telecommunications (BUPT), State Key Laboratory of Networking and Switching Technology, Beijing, China. His research interests include the future Internet, services computing, computer vision, augmented reality, virtual reality, and 5G networks. Prof. Qiao was a recipient of the Beijing Nova Program in 2008 and the First Prize of the 13th Beijing Youth Outstanding Science and Technology Paper Award in 2016.



Lei Yang is a senior researcher in China Mobile Research Institute, where she also serves as the technical manager of the multimedia research group. Her research interests include multimedia service designing, VR/AR video techniques, QoS techniques for video-based service and computer vision. She is a contributor for more than 10 national industrial standards on VR/AR or QoS, and an editor for 3 ongoing international standard work items.



Yansheng Fu is R&D Director of Pico who has more than 10 years working experience of R&D and management. He worked in Lucent and Intel, engaged in the R&D of communication, mobile Internet, VR/AR and other fields. He received his master degree from Harbin Institute of technology.



Wei Lyu is currently lead of Nreal's software and hardware product planning, research and development, including next-generation MR headset, NRSDK, Nebula (3D System), and industrial solutions (Dingtalk Work Space, co-produced with Alibaba Dingtalk). She is an AR believer. She co-founded an AR startup invested by Y Combinator in the U.S before she joined Nreal.

Tutorial 3: Introduction to Graph Neural Networks

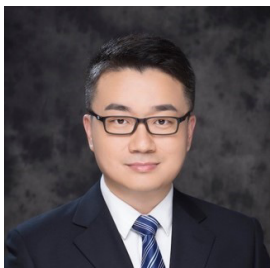
Monday October 19, 13:00 - 16:00 UTC

Speakers: Zhiyuan Liu, Tsinghua University; Jie Zhou, Tsinghua University; Ganqu Cui, Tsinghua University

Summary: Graphs are a useful and ubiquitous data structure and enormous research efforts have been devoted to graph representation learning recently. Compared to images or text, graphs are typical non-Euclidean data which requires special methods for modeling. Recently, graph neural networks (GNNs) have been proposed to operate on graphs and have achieved promising results in numerous application fields recently. In this tutorial, we provide an introduction to the basic concepts, models, and applications of graph neural networks. The tutorial starts from the vanilla GNN model and followed by its recent variants such as graph convolutional networks, graph recurrent networks, and graph attention networks. Variants designed for different graph types and trained by advanced training methods are also included. In the second part, we will introduce recent applications of GNNs in structural scenarios, non-structural scenarios, and other scenarios. Finally, we will talk about recent advances in self-supervised graph representation learning and our recent work on self-supervised attributed graph embedding.

Background required for tutorial attendance:

This tutorial is intended for those who are interested in and with little knowledge (but not required) of graph neural networks and graph representation learning. It is better for the audience to have basic background knowledge in deep learning and machine learning.



Zhiyuan Liu is an associate professor at the Department of Computer Science and Technology, Tsinghua University. He received his Ph.D. degree in Computer Science from Tsinghua in 2011. His research interests include representation learning, knowledge graphs and social computation, and has published more than 80 papers in top-tier conferences and journals of AI and NLP including ACL, IJCAI and AAAI, cited by more than 7,800 according to Google Scholar. He is the recipient of the Excellent Doctoral Dissertation of Tsinghua University, the Excellent Doctoral Dissertation of CAAI (Chinese Association for Artificial Intelligence), Outstanding Post-Doctoral Fellow in Tsinghua University, MIT Technology Review Innovators Under 35 China (MIT TR-35 China), BAAI Young Scientist. He serves as Youth Associate Editor of Frontiers of Computer Science, Area Chairs of ACL, EMNLP, COLING, IJCNLP, etc.



Jie Zhou is a third-year Master's student of the Department of Computer Science and Technology, Tsinghua University. He got his B.E. from Tsinghua University in 2016. His research interests include graph neural networks and natural language processing.



Ganqu Cui is a second year master student of the Department of Computer Science and Technology, Tsinghua University. He received his B.E. degree from Tsinghua University in 2019. His research interests include graph neural networks and network representation learning.

Tutorial 4: DevOps for Software Engineers

Monday October 19, 19:00 - 22:00 UTC

Speaker: John J. Rofrano, IBM T.J. Watson Research Center

Summary: This tutorial will give attendees first-hand experience in building a microservice and deploying it as a container on Kubernetes using DevOps practices and methods. An overview of DevOps culture and microservice architecture will be presented as a backdrop to the hands-on exercise. Attendees will build a simple Python Flask microservice using Test Driven Development techniques and run it locally. Then we will introduce the concepts of Docker and wrap that service in a Docker container and re-run our tests proving that the behavior has not changed. We will then set up a CI/CD pipeline and deploy the microservice to a local Kubernetes cluster. Finally, we will add persistence to our microservice and deploy a Redis service in our Kubernetes cluster for our microservice to use showing how to use secrets for storing sensitive information like database credentials. The tutorial will switch between lecture and lab several times as new concepts are introduced and then quickly demonstrated and implemented in the hands-on exercise. Attendees will come away with a good understanding of how modern software is delivered using DevOps tools and practices with a programmable containerized infrastructure like Kubernetes.



John J. Rofrano is a Senior Technical Staff Member and DevOps Champion at IBM T.J. Watson Research Center where he leads a variety of research projects exploring the use of AI and Machine Learning for accelerating Application Modernization to Cloud. He is also an Adjunct Professor at New York University Courant Institute where he teaches a masters class on DevOps and Agile Methodologies. John has authored numerous patents, papers, and books, and is an accomplished musician and videographer.

Doctoral Symposium



Barbara Carminati
University of Insubria
DS Program Chair

Message from the Chairs: After the success of the first edition in 2019, we are honored to welcome to the 2nd Doctoral Symposium of the 2020 IEEE World Congress on Services (IEEE SERVICES 2020).

Since last edition, the world is dramatically changed. The urgency of tackling COVID-19 has led to unprecedented global efforts: researches from almost all fields of study, from medicine, biology, data science to computer science, are jointly working to respond to the pandemic crisis. What we are learning is that research and innovation are the key factors to win this battle. This motivates us to continue our support to PhD students.

The Doctoral Symposium aims at providing a venue in which PhD students can present their work in front of an audience, having the opportunities to meet, even virtually, with peers and experienced researchers, receive feedback, and learn from each other's experiences.

We received a healthy number of submissions from PhD students from all over the world. After review and discussion phases, the PC chairs accepted 5 submissions. These accepted manuscripts cover diversified topics such as but not limited to service computing, big data and analytics.

We would like to thank Professor Peter Chan, Professor Carl Chang, and Professor Ernesto Damiani for their leadership to make the PhD symposium successful.



Bing Li
Wuhan University
DS Program Chair

Tues 10/20, 07:00 - 08:20

Doctoral Symposium I

Session Chair: Barbara Carminati, University of Insubria



Jery Li
IBM Research China
DS Program Chair

Petri Nets Based Verification of Epistemic Logic and Its Application on Protocols of Privacy and Security
Leifeng He and Guanjun Liu

Resource Optimization Service Chain Composition and Deployment in IoT
Lintao Xian, Meng Wang and Wenxiang Jiang

MANE: Model-Agnostic Non-linear Explanations for Deep Learning Model
Yue Tian and Guanjun Liu

Tues 10/20, 08:40 - 10:00

Doctoral Symposium II

Session Chair: Bing Li, Wuhan University

Adaptive Service Configuration for Edge Resource Allocation in Business Process
Mengyu Sun and Zhangbing Zhou

A New Automatic Chinese Poetry Generation Model Based on Neural Network
Tian Gao, Pengcheng Xiong and Jialie Shen

2020 IEEE International Conference on Cloud Computing (CLOUD 2020) Message from the Chairs



Claudio Ardagna
University of Milan
Program Chair

IEEE CLOUD, held since 2009, is a top-ranked, flagship international conference focusing on innovative cloud computing across all "as a service" categories, including Network, Infrastructure, Platform, Software, and Function. IEEE CLOUD brings together a diverse community to share ideas, present research results, and discuss experiences in building some of the world's most challenging cloud system and applications.

IEEE CLOUD 2020 is the 12th IEEE International Conference on Cloud Computing. As the most prestigious academic conference in the field of Cloud Computing, IEEE CLOUD conference has proven to be an important venue for enabling research and collaboration, and we expect that IEEE CLOUD 2020 will continue this trend.



Shangguang Wang
Beijing University of
Posts &
Telecommunications
Program Chair

Cloud Computing has become an elastic pay-as-you-go service creation, delivery, consumption, and management platform in Services Computing, and has recently met modern distributed systems based on edge computations and 5G/6G communications to implement novel services and architectures. The technical foundations of Cloud Computing include service-oriented architectures, virtualization of hardware and software, process and workflow optimization, data management and storage, usage-based accounting and billing, and mobile cloud-edge systems. The goal of Cloud Computing is to cost-effectively manage the lifecycle of quality-assured and trustworthy services and to share resources among service consumers, partners, and vendors in the cloud value chain. The resource sharing at various levels results in different cloud offerings, such as infrastructure clouds (e.g. hardware, IT infrastructure management), software clouds (e.g. software as a service focusing on middleware as a service, or traditional CRM as a service), application clouds (e.g. application as a service, social network as a service), and business clouds (e.g. business process as a service).

This year's conference attracted 256 submissions. Each paper was reviewed by at least 3 program committee members. After initial review and follow-up discussions, the program committee selected 53 articles to appear as full papers (resulting in an acceptance rate of 20.7%) for presentation in the research track. Another 13 articles have been selected as short papers. In addition, we had an exciting work-in-progress track that consisted of recent works related to many emerging cloud computing research challenges. These accepted papers covered a variety of topics related to cloud including cloud scheduling and management, deep learning framework leveraging cloud architectures, mobile cloud and cloud-edge infrastructures, and HPC systems. In addition to these papers, the conference program included three exciting invited research papers and a within-conference symposium.

The organization of a conference like IEEE CLOUD requires the collaboration of many individuals. First of all, we would like to thank the authors for submitting their work to the conference. We express our gratitude to the program committee members and external reviewers for their efforts in reviewing the papers, engaging in active online discussion during the tough selection process and providing valuable feedback to authors. Meanwhile, we want to thank the Services Congress Steering Committee led by Carl K. Chang, the Services Congress Honorary General Chairs Stephen S. Yau and Peter Chen, the Services Congress General Chairs Elisa Bertino and Hong Mei, and the Services Congress Program Chairs in Chief Ernesto Damiani and Zhi Jin for their help in putting together such an exciting program. Finally, we thank all of you who (virtually) come to the conference. We hope you find the meeting both stimulating and enjoyable, and we hope we will be able to meet you in person next year!

CLOUD 2020

The 2020 IEEE International Conference on Cloud Computing Technical Program

The CLOUD 2020 conference program includes the CLOUD Symposium.

All times are listed in UTC time.

To convert UTC time to your time, use the [UTC Time Zone Converter](#).

Tuesday 10/20, 01:00 - 02:20

CLOUD 1: WIP - Cloud Applications

Session Chair: Liqiang Wang, University of Central Florida

CLD_WIP_187

Anomaly Detection in Cloud Components

Mohammad Saiful Islam and Andriy Miranskyy

CLD_WIP_255

The Research on Agricultural Product Price Forecasting Service Based on Combination Model

Guang Zheng, Hui Zhang, Jingjing Han, Chenhui Zhuang and Lei Xi

CLD_WIP_184

Recursive LSTM with Shift Embedding for Online User-Item Interaction Prediction

Chengyu Yin, Senzhang Wang and Hao Miao

CLD_WIP_259

Designing Knowledge Plane to Optimize Leaf and Spine Data Center

Mujahid Sultan, Dodi Imbuido, James MacDonald and Kumar Ratnam

Tuesday 10/20 02:40 - 04:00

CLOUD 2: WIP - Cloud & Edge Management

Session Chair: Sanjay Patel

CLD_WIP_171

LambDP: Data Processing Framework for Terminal Applications in IoTs Services

Zhao Liqing, Bo Cheng and Jun-Liang Chen

CLD_WIP_66

Adaptive Control Channel Traffic Shaping for Virtualized SDN in Clouds

Yeonho Yoo, Gyeongsik Yang, Minkoo Kang and Chuck Yoo

CLD_WIP_86

TensorExpress: In-Network Communication Scheduling for Deep Learning

Minkoo Kang, Gyeongsik Yang, Yeonho Yoo and Chuck Yoo

CLD_WIP_84

Offloading Deadline-aware Task in Edge Computing

Xin He and Wanchun Dou

Tuesday 10/20, 07:00 - 08:20

CLOUD 3: WIP - Orchestration & Data Analysis

Session Chair: Paolo Ceravolo, Universita Degli Studi di Milano

CLD_WIP_117

Analysis of SQL Workloads on an Enterprise Datalake

Luis Garces-Erice, Sean Rooney and Zoltan Nagy

CLD_WIP_183

Container Orchestration on HPC Systems

Naweiluo Zhou, Yiannis Georgiou, Li Zhong, Huan Zhou and Marcin Pospieszny

CLD_WIP_68

Deep Neural Architecture for Geospatial Trajectory Completion

Asif Nawaz, Zhiqiu Huang, Senzhang Wang and Amara Naseer

CLD_WIP_244

Constrained Energy-Cost-Aware Workflow Scheduling for Cloud Environment

Emmanuel Bugingo, Defu Zhang and Wei Zheng

Tuesday 10/20, 08:40 - 10:00

CLOUD 4: Cloud Performance Evaluation

Session Chair: Paolog Ceravolo, Universita Degli Studi di Milano

CLD_REG_282

Serverless Elastic Exploration of Unbalanced Algorithms

Gerard Paris, Pedro Garcia Lopez and Marc Sanchez-Artigas

CLD_REG_154

DEAR: Distributed Evaluation of Alerting Rules

Mathias Mormul, Pascal Hirmer, Christoph Stach and Bernhard Mitschang

CLD_REG_152

A Content-wise Data Placement Policy for Improving the Performance of MapReduce-based Processing Applications in Cloud Computing

Eihab Saatialsoruji

Tuesday 10/20, 19:00 - 20:20

CLOUD 5: Invited I

Part of the CLOUD Symposium

Session Chair: Claudio Ardagna, Universita Degli Studi di Milano

CLD_INV_327

Secure IoT Data Analytics in Cloud via Intel SGX

Md Shihabul Islam, Mustafa Safa Ozdayi, Latifur Khan and Murat Kantarcioglu

CLD_INV_326

Be Your Neighbor's Miner: Building Trust in Ledger Content via Reciprocally Useful Work

Lara Mauri, Ernsto Damiani and Stelvio Cimato

CLD_INV_323

The Million Dollar Handshake: Secure and Attested Communications in the Cloud

Nikolaos Chalkiadakis, Dimitris Deyannis, Dimitris Karnikis, Giorgos Vasiliadis and Sotiris Ioannidis

Tuesday 10/20, 20:40 - 22:00

CLOUD 6: Invited II

Part of the CLOUD Symposium

Session Chair: Wensheng Zhang, Iowa State University

CLD_INV_309

ViCLOUD: Measuring Vagueness in Cloud Service Privacy Policies and Terms of Services
Anantaa Kotal, Karuna Pande Joshi and Anupam Joshi

CLD_INV_325

VR Design and Display System of Ceramic Products Based on Cloud Service Platform
Wen-Tao Zhang, Hua Huang, Meikang Qiu and Qiangfei Ma

CLD_INV_328

Cloud Governance
Bhavani Thuraisingham

CLD_INV_324

Service Management in the Edge Cloud for Stream Processing of IoT Data
Hachem Moussa, I-Ling Yen and Farokh Bastani

Wednesday 10/21, 01:00 - 02:20

CLOUD 7: Service Prediction & Optimization

Session Chair: Rodrigo Neves Calheiros, Western Sydney

CLD_REG_20

Service Load Prediction based on User Knowledge Level Evolution for Software Development
Knowledge Base
Ming Yi, Yuliang Shi and Kun Zhang

CLD_REG_31

Scalable Graph Convolutional Network based Link Prediction on a Distributed Graph Database
Server
Miyuru Dayarathna, Anuradha Karunarathna, Dinika Senarath, Shalika Madhushanki, Sanath
Jayasena, Toyotaro Suzumura and Chinthaka Weerakkody

CLD_REG_26

Resource and Job Execution Context-aware Hadoop Configuration Tuning
Xinhe Wang, Jianlin Zhang and Yuliang Shi

Wednesday 10/21, 02:40 - 04:00

CLOUD 8: Edge Applications I

Session Chair: Mengwei Xu, Beijing University of Posts & Telecommunications

CLD_REG_139

Wasmachine: Bring the Edge up to Speed with A WebAssembly OS
Jiaqi Wen and Gerald Weber

CLD_REG_104

Allies: Tile-based Joint Transcoding, Delivery and Caching of 360° Videos in Edge Cloud Networks
Jianxin Shi, Lingjun Pu and Jingdong Xu

CLD_REG_163

Multi-objective Cross-layer Resource Scheduling for Internet of Things in Edge-Cloud Computing
Ruichao Mo, Fei Dai, Qi Liu, Wanchun Dou and Xiaolong Xu

Wednesday 10/21, 07:00 - 08:20

CLOUD 9: Edge Caching & Computation Offloading

Session Chair: Xiao Ma, Beijing University of Posts & Telecommunications

CLD_REG_79

Collaborative Computation Offloading Approach for Smart Cities in Mobile Edge Computing
Hualong Huang, Kai Peng and Xiaolong Xu

CLD_REG_115

Optimal Application Deployment in Mobile Edge Computing Environment
Fefei Chen, Jingwen Zhou, Xiaoyu Xia, Hai Jin and Qiang He

CLD_REG_172

Proactive Data Cache and Replacement in the Edge Computing Environment
Ying Liu, Ao Zhang, Xiaoyu Xia, Feifei Chen, Qiang He and Bin Zhang

Wednesday 10/21, 08:40 - 10:00

CLOUD 10: Cloud Applications II

Session Chair: Valerio Bellandi, University of Milan

CLD_REG_16

EventWarden: Toward Efficient Indoor Positioning for Cloud Services in SlOT
Nan Jiang, Guangjie Dong, Yiyang Hu, Li Gao and Jing Chen

CLD_REG_233

VMatch: A Matching Theory Based VDC Reconfiguration Strategy
Anurag Satpathy, Manmath Narayan Sahoo, Lucky Behera, Chittaranjan Swain and Ashutosh Mishra

CLD_REG_224

Deep Unsupervised Anomaly Sequence Detection with Fusion of Spatial and Temporal Feature in the Cloud
Wang Mengqing, Zhang Zhihua, Liu Jialei, Duan Li and Liu Chunhong

Wednesday 10/21, 20:40 - 22:00

CLOUD 11: Cloud Applications III

Session Chair: Keman Huang, MIT

CLD_REG_305

Mystiko: Cloud-Mediated, Private, Federated Gradient Descent
K.R. Jayaram, Archit Verma, Ashish Verma, Gegi Thomas and Colin Sutchter-Shepard

CLD_REG_74

PONCHE: Personalized and Context-aware Vehicle Rerouting Service
Lucas Ladeira, Allan de Souza, Thiago Silva, Richard Pazzi and Leanro Villas

CLD_REG_25

Auto-Generation of Domain-Specific Systems: Cloud-Hosted DevOps for Business Users
Saurabh Sinha, Tara Astigarraga, Richard Hull, Nerla Jean-Louis, Vugranam Sreedhar, Hao Chen, Lian Xue Hu, Federico Carpi, Juan Ariel Brusco Cannata and William Loach

Thursday 10/22, 01:00 - 02:20

CLOUD 12: Cloud Management I

Session Chair: Shuai Zhao, Beijing University of Posts & Telecommunications

CLD_REG_3
Auto-Scaling Cloud-Based Memory-Intensive Applications
Joe Novak, Sneha Kasera and Ryan Stutsman

CLD_REG_303
ImageJockey: A Framework for Container Performance Engineering
Takeshi Yoshimura, Rina Nakazawa and Tatsuhiro Chiba

CLD_REG_275
Flexible and Efficient Partial Migration of Split-memory VMs
Takahiro Kashiwagi and Kenichi Kourai

Thursday 10/22, 02:40 - 04:00

CLOUD 13: SDN and NFV

Session Chair: Liguang Xie

CLD_REG_97
A Hierarchical Control Plane Framework for Integrated SDN-SFC Management in Multi-tenant Cloud Data Centers
Lakshmi B S and Lakshmi J

CLD_REG_136
Resource Optimization and Delay-aware Virtual Network Function Placement for Mapping SFC Requests in NFV-enabled Networks
Yi Yue, Bo Cheng and Xuan Liu

CLD_REG_142
QoS Control Method Based on SDN for Mobile Cloud Service
Jiang Bingcheng, Qian He, Xiongying Li and Huan Huang

Thursday 10/22, 13:00 - 14:20

CLOUD 14: Serverless Computers and Containers

Session Chair: Nabil El Ioini

CLD_REG_23
On the Use of Containers in High Performance Computing Environments
Arnab K. Paul, Subil Abraham, Redwan Ibne Seraj Khan and Ali R. Butt

CLD_REG_159
Lambdata: Optimizing Serverless Computing by Making Data Intents Explicit
Yang Tang and Junfeng Yang

CLD_REG_189
Serverless Computing: Behind the Scenes of Major Platforms
Daniel Kelly, Frank Glavin and Enda Barrett

Thursday 10/22, 14:40 - 16:00

CLOUD 15: Symposium Panel

Part of the CLOUD Symposium

Panel Chair: Gopal S. Pingali, IBM India

Cloud computing is fast evolving into a continuum that seamlessly spans many public clouds, on-premise and off-premise private clouds, and millions of edge devices. This continuum is enabled by the shift to containers, microservices, and nanoservices. The serverless computing

platforms of many vendors are evolving to effectively span the spectrum of deployment models to truly realize a “build once and deploy anywhere” capability. AWS Outposts and Fargate, Google Anthos, RedHat OpenShift, IBM Satellite, and Microsoft Azure Arc are all steps forward in this direction of a distributed cloud continuum. The effective application and extension of the serverless architecture in this continuum is still at its infancy. The underlying architecture, programming models, debugging and test methods, end-to-end DevOps, and the economics – all need to evolve to fully enable serverless in this context. At the same time, numerous promising application scenarios of serverless computing are emerging – ranging from energy management, climate modeling, autonomous vehicles, highly automated enterprise environments, online education, 5G telecommunications, content distribution networks, and the tracking and containment of pandemics. This panel will look at the rich landscape and ongoing evolution of serverless computing, especially in the context of a distributed cloud continuum.



Panel Chair: Gopal Pingali, IBM India

Dr. Gopal Pingali is an internationally renowned technology, innovation, and transformation executive with extensive experience in driving digital transformation across multiple industries leveraging Cloud, AI, and Automation technologies. He has worked for two decades in the US and a decade in India and built several global technical organizations with an entrepreneurial spirit. He pioneered innovations spanning Multicloud Management, Cognitive Automation, Continuous Security, Mobile Web, Electronic Chronicles, Real-time Video Tracking Systems, Smart Interactive Spaces, Visual Information Systems for Sports, Autonomous Vehicles, and

Nanotechnology. In his most recent position, he was Global Vice President and Distinguished Engineer of the Global Technology Services Labs at IBM. He obtained his Ph.D. in Computer Science and Engineering from the University of Michigan at Ann Arbor.



Andrew Chien, University of Chicago

Dr. Andrew A. Chien is the William Eckhardt Professor in Computer Science and Director of the CERES Center for Unstoppable Computing at the University of Chicago and a Senior Computer Scientist at Argonne National Laboratory. He also serves at the Editor-in-Chief for the Communications of the ACM. From 2011-2017 he led the systems initiative to build Computer Science at University of Chicago that transformed its culture and reputation. From 2005 to 2010, Chien was Vice President of Research of Intel Corporation, and from 1998 to 2005, the SAIC Chair Professor in Computer Science and founder of the Center for Networked Systems at UCSD. His

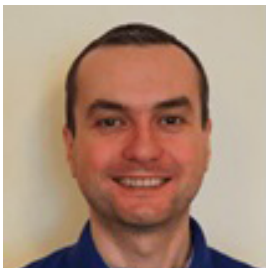
research has been recognized for excellence with numerous awards, and also supported by the NSF, DARPA, DOE, ONR, NASA, and industry. From 1990 to 1998, he was a Professor of Computer Science at University of Illinois. Dr. Chien earned BS, MS, and PhD degrees from the Massachusetts Institute of Technology, and is a Fellow of the ACM, IEEE, and AAAS.



Sai Kolluri, Google

Sai Kolluri is an Enterprise Cloud Architect at Google Cloud focused on working with large scale enterprises to bring about a step change in their cloud transformation journey. He carries a deep client experience and has been a trusted advisor with clients across the globe spanning key industry verticals. Sai’s expertise is testimonial to the numerous roles he played in the past while at IBM for over a decade. He has built and delivered numerous integrated solutions and offerings across private and public clouds for global clientele. He has contributed to 8 patents.

Maciej Malawski, AGH University of Science & Technology



Maciej Malawski holds a Ph.D. in computer science and an M.Sc. in computer science and in physics. In 2011-2012 he was a postdoc at the University of Notre Dame, USA. Currently he is an associate professor at the Department of Computer Science AGH and a researcher at Sano Centre for Computational Medicine in Krakow, Poland. He is a Co-author of over 100 international publications. He is Team Leader representing the Department of Computer Science AGH in the TOTEM and CMS experiments at the LHC at CERN. He has participated in several EU projects (VPH-Share, PaaSage, EurValve). His scientific interests include parallel and distributed computing, cloud

technologies, and scientific applications using novel computing infrastructures.

Maja Vukovic, IBM Research, TJ Watson Research Center



Maja Vukovic is a Distinguished Research Staff Member and Research Manager at IBM Research, T.J. Watson Research Center. Her team is responsible for building AI solutions for application modernization and AIOps in hybrid cloud environments. Maja is a member of IBM Academy of Technology and has received numerous IBM Outstanding Technical Achievement Awards and IBM Research awards. She is an IBM Master Inventor and holds 130 patents, a Senior Member of IEEE, and was awarded Women in Services Computing Award by IEEE in 2018. Maja has received her Ph.D. from the University of Cambridge, for her work on context-aware service composition using AI planning.

Thurs day 10/22, 19:00 - 20:20

CLOUD 16: Microservices & Containers

Session Chair: Rasool Asal

CLD_REG_322

Realizing A Composable Enterprise Microservices Fabric with AI-Accelerated Material Discovery API Services

Rong Chang, Kumar Bhaskaran, Prasenjit Dey, Hsiang Han Hsu, Seiji Takeda and Toshiyuki Hama

CLD_REG_279

Sledge: Towards Efficient Live Migration of Docker Containers

Bo Xu, Song Wu, Jiang Xiao, Hai Jin, Yingxi Zhang, Guoqiang Shi, Lin Tingyu, Jia Rao, Li Yi and Jizhong Jiang

CLD_REG_193

RITA: Efficient Memory Allocation Scheme for Containerized Parallel Systems to Improve Data Processing Latency

Danlin Jia, Mahsa Bayati, Ron Lee and Ningfang Mi

Thursday 10/22, 20:40 - 22:00

CLOUD 17: Edge Application II

Session Chair: Heiko Ludwig, IBM

CLD_REG_137

Optimizing Allocation and Scheduling of Connected Vehicle Service Requests in Cloud/Edge Computing

Yecheng Zhao and Baekgyu Kim

CLD_REG_203

DeepPM: Efficient Power Management in Edge Data Centers using Energy Storage

Zhihui Shao, Mohammad Islam and Shaolei Ren

CLD_REG_209

CFP: A Cross-layer Recommender System with Fine-grained Preloading for Short Video Streaming at Network Edge

Dezhi Ran, Yuanxing Zhang, Ye Yuan and Kaigui Bian

Friday 10/23, 01:00 - 02:20

CLOUD 18: Network and Storage Optimization

Session Chair: Liguang Xie

CLD_REG_67

A Lightweight SOA-based Network Slicing Creation System
Meng Wang, Bo Cheng and Junliang Chen

CLD_REG_52

PCHA: A Fast Packet Classification Algorithm for IPv6 Based on Hash and AVL Tree
Yuyan Zhang, Xingxing Chen and Xu Zhang

CLD_REG_148

An Efficient Database Backup and Recovery Scheme using Write-Ahead Logging
Hwajug Kim, Heonyoung Yeom and Yongseok Son

Friday 10/23, 02:40 - 04:00

CLOUD 19: Deep Learning & Federated Learning

Session Chair: Heiko Ludwig, IBM

CLD_REG_149

The Design and Implementation of a Scalable DL Benchmarking Platform
Cheng Li, Abdul Dakkak, Jinjun Xiong and Wen-Mei Hwu

CLD_REG_169

FedMax: Enabling a Highly Efficient Federated Learning Framework
Haohang Xu, Jin Li, Hongkai Xiong and Hui Lu

CLD_REG_241

Variable Batch Size Across Layers for Efficient Prediction on CNNs
Anamitra Roy Choudhury, Saurabh Goyal, Yogish Sabharwal and Ashish Verma

Friday 10/23, 07:00 - 08:20

CLOUD 20: Cloud Management & Governance

Session Chair: Marco Anisetti, IBM

CLD_REG_144

Towards Tracking Data Flows in Cloud Architectures
Immanuel Kunz, Valentina Casola, Angelika Schneider, Christian Banse and Julian Schutte

CLD_REG_182

Enforcing Corporate Governance's Internal Controls and Audit in the Cloud
Sabrina De Capitani di Vimercati, Sara Foresti, Stefano Paraboschi and Pierangela Samarati

CLD_REG_207

Maximizing Reliability of Data-Intensive Workflow Systems with Three Fault Tolerance Schemes in Cloud
Weiling Li, Qiang He, Kewen Liao, Xiaoning Sun, Feifei Chen and Yunni Xia

Friday 10/23, 08:40 - 10:00

CLOUD 21: SHORT - Cloud Modeling I

Session Chair: Marco Anisetti, IBM

CLD_SHT_260

Modelling VM Latent Characteristics and Predicting Application Performance using Semi-supervised Non-negative Matrix Factorization
Yuhui Lin, Adam Barker and John Thomson

CLD_SHT_280

Proactive Container Auto-scaling for Cloud Native Machine Learning Services
David Buchaca, Josep Berral, Chen Wang and Alaa Youssef

CLD_SHT_293

What-if QoS Prediction of Cloud-hosted Web Services via Domain Adaptation in Evolutionary Scenarios
Tianqi Sun and Jianpeng Hu

Friday 10/23, 14:40 - 16:00

CLOUD 22: Cloud Performance & Maintenance

Session Chair: Nabil El Ioini

CLD_REG_218

Scheduling Physical Machine Maintenance on Qualified Clouds: What if Migration is not Allowed?
Long Wang, Harigovind Ramasamy and Richard Harper

CLD_REG_247

RAD: Detecting Performance Anomalies in Cloud-based Web Services
Joydeep Mukherjee, Alexandru Baluta, Marin Litoiu and Diwakar Krishnamurthy

Saturday 10/24, 01:00 - 02:20

CLOUD 23: SHORT - Cloud Modelling II

Session Chair: Liqiang Wang, University of Central Florida

CLD_SHT_251

A Noise-aware Asymmetric Spectral Regularization Collective Matrix Factorization Algorithm for Recommender System in Cloud Services
Jun Tao Han and Yong Pan

CLD_SHT_266

Phase Aware Performance Modeling for Cloud Workloads
Arnaboy Bhattacharyya, Eyal De Lara and Cristiana Amza

CLD_SHT_312

Cloud Resource Provisioning and Bottleneck Eliminating for Meshed Web Systems
Yamin Lei, Zhicheng Cai, Hang Wu and Rajkumar Buyya

Saturday 10/24, 02:40 - 04:00

CLOUD 24: SHORT - Cloud Management II

Session Chair: Zhe Fu

CLD_SHT_291

VM Migration for Secure Out-of-band Remote Management with Nested Virtualization
Tomoya Unoki and Kenichi Kourai

CLD_SHT_302

A Prediction Based Replica Selection Strategy for Reducing Tail Latency in the Distributed System
Santa Maria Shithil and Muhammad Abdullah Adnan

CLD_SHT_314

Energy Efficient Decentralized Geographical Load Balancing via Dynamic Deferral of Workload
Zeenat Islam, Md Moniruzzaman and Muhammad Abdullah Adnan

Saturday 10/24, 07:00 - 08:20

CLOUD 25: SHORT - Cloud Applications IV

Session Chair: Yingjie Wang

CLD_SHT_288

Evaluating Concurrent Executions of Multiple Function-as-a-Service Runtimes with MicroVM
Jungae Park, Hyunjune Kim and Kyungyong Lee

CLD_SHT_319

A Control System for Managing the Flexibility in BPMN Models of Cloud Service Workflows
Imen Ben Fradj, Yousra Bendaly Hlaoui and Leila Ben Ayed

CLD_SHT_277

Spark-Tuner: An Elastic Auto-Tuner for Apache Spark Streaming
M. Reza Hoseinyfarahabady, Javid Taheri, Albert Zomaya and Zahir Tari

Saturday 10/24, 08:40 - 10:00

CLOUD 26: Cloud Security

Session Chair: He Qian

CLD_REG_10

Forward Secure Public Key Encryption with Keyword Search for Cloud-assisted IoT
Hyeongseob Kim, Changhee Hahn and Junbeom Hur

CLD_REG_127

Robustness Analysis of Triangle Relations Attack in Social Recommender Systems
Jia Wang, Min Gao, Zongwei Wang, Runsheng Wang and Junhao Wen

CLD_REG_98

LSH-based Collaborative Recommendation Method with Privacy-Preservation
Jiangmin Xu, Xuansong Li, Hao Wang, HongONing Dai and Shunmei Meng

Saturday 10/24, 13:00 - 14:20

CLOUD 27: Edge-Cloud Collaboration

Session Chair: Zigui Jiang

CLD_REG_92

GMAS: A Geo-Aware MAS Based Workflow Allocation Approach on Hybrid-Edge-Cloud Environment
Meng Niu, Bo Cheng and Jun-Liang Chen

CLD_REG_18

Multi-request Scheduling and Collaborative Service Processing for DASH-video Optimization in Cloud-Edge Network
Xuan Zhao, Song Zhang and Wanchun Dou

CLD_REG_229

JANUS: Benchmarking Commercial and Open-Source Cloud and Edge Platforms for Object and Anomaly Detection Workloads
Karthick Shankar, Pengcheng Wang, Ran Xu, Ashraf Mahgoub and Somali Chaterji

Saturday 10/24, 13:00 - 14:20

CLOUD 28: Cloud Task Scheduling

Session Chair: Lingyan Zhang

CLD_REG_8

RSDS: Getting System Call Whitelist for Container Through Dynamic and Static Analysis
Xuhao Wang, Qingni Shen, Pengfei Wu and Wu Luo

CLD_REG_138

Skedulix: Hybrid Cloud Scheduling for Cost-Efficient Execution of Serverless Applications
Anirban Das, Andrew Leaf, Carlos A. Varela and Stacy Patterson

CLD_REG_146

Toposch: Latency-Aware Scheduling Based on Critical Path Analysis on Shared YARN Clusters
Chunming Hu, Jianyong Zhu, Renyu Yang, Hao Peng, Tianyu Wo, Shiqing Xue, Xiaoqiang Yu, Jie Xu and Rajiv Ranjan

IEEE International Conference on Edge Computing (EDGE 2020)

Message from the Chairs



Xuanzhe Liu
Peking University
Program Chair

Welcome to IEEE EDGE 2020!

IEEE EDGE 2020 is the 4th edition of the IEEE reputable international forum for researchers and practitioners in the fast-growing area of Edge Computing and Fog Computing, which is closely related to many other critical techniques such as 5G, cloud computing, IoT, etc. It brings together a diverse community to share ideas, present experimental results, and discuss experiences in building some of the world's most challenging systems. We expect that this conference will provide answers to many open questions of an architecture, abstraction, resource management, and communication nature about edge computing.



Mudhakar Srivatsa
IBM Research
TJ Watson Research
Center
Program Chair

EDGE 2020 received a total of 61 submissions. Each paper was reviewed by at least 3 PC members followed by online discussions. The final decisions were made by the PC chairs according to the review results. As the result, 23 papers were accepted, including 18 for regular track and 5 for industry track, with a acceptance rate of 37.7%. The overall quality of submissions was rather high and many difficult decisions had to be made to ensure our aim of selecting highest quality submissions. As a community we can be proud of the work composing the technical program of the conference. It consists of 8 sessions on various aspects of edge computing.

We sincerely appreciate the work and effort of the authors for preparing their submissions for review, considering and addressing the reviewers' comments before submitting the camera-ready versions of their accepted papers, and attending the conference to present and discuss their work.

We would like to thank the PC members and additional reviewers for their dedicated service that they provided for the community to ensure that the large number of submissions received the consideration and attention they deserve. As program committee chairs we especially appreciate the detailed and very thorough yet timely completion of reviews and the input into the final selection phases.



Tao Sun
China Mobile Research
Institute
Program Chair

We also want to thank the IEEE 2020 Congress of Services Organizing Committee, especially Congress General Chairs Elisa Bertino and Hong Mei, Congress Steering Committee Chair Carl Chang, Congress Program Chairs-In-Chief Ernesto Damiani and Zhi Jin, and of course, the general chairs of EDGE 2020 Shangguang Wang, Schahram Dustdar, and Xiaodong Duan for their help in putting together such an exciting program. Finally, we thank all of you who have come to the conference and hope that you find the conference both stimulating and enjoyable!

EDGE 2020

The 2020 IEEE International Conference on Edge Computing Technical Program

All times are listed in UTC time.
To convert UTC time to your time, use the [UTC Time Zone Converter](#).

Tuesday 10/20, 01:00 - 02:20 - China time: 09:00 - 10:20
EDGE 1: AI and Machine Learning in Edge Computing
Session Chair: Chenren Xu, Peking University

EDG_REG_52

Vehicle Speed Aware Computing Task Offloading and Resource Allocation Based on Multi-agent Reinforcement Learning in a Vehicular Edge Computing Network
Xinyu Huang, Lijun He and Wanyue Zhang

EDG_REG_41

A Camera-radar Fusion Method based on Edge Computing
Yanjin Fu, Daxin Tian, Xuting Duan, Jianshan Zhou, Ping Lang, Chunmian Lin and Xin You

EDG_REG_35

RS-pCloud: An Peer to Peer Based Edge-Cloud System for Fast Remote Sensing Image Processing
Tongzheng Xun, Jingpan Xiong, Yang Wang, Tianhui Meng, Xi Chen and Cheng-Zhong Xu

Tuesday 10/20, 02:40 - 04:00 - China time: 10:40 - 12:00
EDGE 2: Edge-enabled Applications
Session Chair: Yi Liu, Peking University

EDG_REG-25

Noninvasive Industrial Power Load Monitoring based on Collaboration of Edge Device and Edge Data Center
Yu Jinying, Liu Weinan and Wu Xin

EDG_REG_21

A FPGA Based Intra-parallel Architecture for PageRank Graph Processing
Mei Guoqiang, Hao Rui, Wang Jiangwei, Kan Hongwei and Li Rengang

EDG_REG_36

A Service Continuity Management Method for MEC-Assisted C-V2X Applications
Li Hao, Wei Liu, Ye Wang, Yuanyuan Bao, Feng Li and Wai Chen

Tuesday 10/20, 07:00 - 08:20 - China time: 15:00 - 16:20
EDGE 3: Industry Applications
Session Chair: Tao Sun, China Mobile

EDG_IND_22

The 5G MEC Applications in Smart Manufacturing
Ning Mu, Shulei Gong, Wanqing Sun and Quan Gan

EDG_IND_30

Astraea: Deploy AI Services at the Edge in Elegant Ways

Zhe Fu, Jingyu Yang, Changming Bai, Xiao Chen, Cun Zhang, Yanlin Zhang and Dongsheng Wang

EDG_IND_55

Solutions for Variant Manufacturing Factory Scenarios Based on 5G Edge Features

Yongjing Li, Dan Wang, Tao Sun, Xiaodong Duan and Lu Lu

Wednesday 10/21, 01:00 - 02:20 - China time: 09:00 - 10:20

EDGE 4: From Edge to Fog and Cloud

Session Chair: Jiliang Wang, Tsinghua University

EDG_REG_62

Analyzing Distributed Deep Neural Network Deployment on Edge and Cloud Nodes in IoT Systems

Majid Ashouri, Sergej Svorobej, Fabian Lorig, Paul Davidsson and Romina Spalazzese

EDG_REG_33

Towards Extensibility-aware Scheduling of Industrial Applications on Fog Nodes

Mohammadreza Barzegaran, Vasileios Karagiannis, Cosmin Avasalcăi, Paul Pop, Stefan Schulte and Schahram Dustdar

EDG_REG_57

Joint Optimization of Task Offloading and Resource Allocation via Deep Reinforcement Learning for Augmented Reality in Mobile Edge Network

Xing Chen and Guizhong Liu

Wednesday 10/21, 02:40 - 04:00 - China time: 10:40 - 12:00

EDGE 5: Resource Allocation in Edge Computing

Session Chair: Jianshan Zhou, Beihang University

EDG_REG_23

Risk-aware Application Placement in Mobile Edge Computing Systems: A Learning-based Optimization Approach

Hossein Badri, Tayebah Bahreini, Daniel Grosu and Kai Yang

EDG_REG_53

Edge Federation: A Dependency-aware Multi-task Dispatching and Co-location in Federated Edge Container Instances

Uchechukwu Awada and Jiankang Zhang

EDG_REG_58

Multi-access Edge Computing Based User Experience Driven Multicast Video Conference Algorithm

Shan Xu and Guizhong Liu

Wednesday 10/21, 07:00 - 08:20 - China time: 15:00 - 16:20

EDGE 6: Industry Applications II

Session Chair: Ao Zhou, Beijing University of Posts & Telecommunications

EDG_IND_59

Leveraging 5G TSN in V2X Communication for Cloud Vehicle

Dan Wang and Tao Sun

EDG_IND_61

Camera-Based Edge Analytics for Drilling Optimization

Chinthaka Gooneratne, Arturo Magana-Mora, Mike Affleck, William Contreras Otalvora, Guodong Zhan and Timothy Moellendick

IEEE International Conference on Web Services (ICWS 2020)

Message from the Chairs



Zhiyong Feng
Tianjin University
General Chair

IEEE International Conference on Web Services (ICWS) has been a prime international forum for both researchers and industry practitioners to exchange the latest fundamental advances in the state of the art and practice of Web-based services, identify emerging research topics, and define the future of Web-based services. All topics regarding Web-based services lifecycle study and management align with the theme of ICWS. In 2020, we will gather to strive to advance the largest international professional forum on Internet/Web based services.

From a technology foundation perspective, Services Computing has become the default discipline in the modern services industry. As a major implementation technology for modernizing services industry, Web services are Internet-based programmable application components published using standard interface description languages and universally available via uniform communication protocols. In its 24th version, the program of ICWS 2020 will continue to feature research papers with a wide range of topics, focusing on various aspects of Internet and web-based services. Some of the topics include Web services discovery, selection and composition, Web services QoS, Web services security, privacy and trust, Microservices, Web services recommendation, semantics in Web services, Web services-based applications and solutions, Web services management, Web services supporting edge and mobile computing, Web services engineering, IoT services.



Andrzej Goscinski
Deakin University
General Chair

The conference was made possible by the contributions from the research community. The conference received a total of 321 submissions spanning over the early, regular, and final window submission stages, and 10 WiP papers. Following a rigorous single-blind peer-review process, each submission was reviewed by at least three experts in the relevant areas for each paper, based on their significance, novelty, technical quality, presentation, and practical impact. After an intense post-review discussion by the program committee, the conference accepted 58 papers as regular-length papers (i.e., acceptance rate was 18 for regular length papers). The conference also accepted 20 papers as short-length papers, and 1 paper among the submitted WiP papers.



Elena Ferrari
University of Insubria
Program Chair

The 2020 IEEE Web Services Conference was also made possible by the efforts of the many who volunteered their time and energy for the success of the conference. We would like to thank the excellent work of the program committee members for their great efforts in reading, reviewing, discussing, and finally selecting the papers. Our appreciation extends to all the external reviewers for assisting the program committee.

We would also like to acknowledge the generous guidance and support of all Members of the Organizing Committee, in particular Carl K. Chang, Steering Committee Chair, Elisa Bertino and Hong Mei, SERVICES Congress General Chairs, Rong N. Chang, SERVICES Congress Symposia General Chair, Ernesto Damiani and Zhi Jin, SERVICES Congress Program Chairs in Chief, Laurel Ming, Web Chair.



Jing Fan
Zhejiang University of
Technology
Program Chair

We would like to dedicate ICWS 2020 to two of our PC members, Dr. Florian Daniel and Dr. Sherif Sakr, who suddenly passed away in the spring of 2020. Florian and Sherif have been great contributors of ICWS and will be sadly missed by the SERVICES community.

We wish you all a productive and enjoyable conference in virtual Beijing and hope you find the program a valuable source of information on Web Services research.

ICWS 2020

The 2020 IEEE International Conference on Web Services Technical Program

All times are listed in UTC time.
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Tuesday 10/20, 01:00 - 02:20

ICWS Session 1: Blockchain & Trust

Session Chair: Lizhen Cui, Shandong University

CWS_REG_16

Just-in-Time Memoryless Trust for Crowdsourced IoT Services

Mohammed Bahutair, Athman Bouguettaya and Azadeh Ghari Neiat

CWS_REG_137

EventWarden: A Decentralized Event-drive Proxy Service for Outsourcing Arbitrary Transactions in Ethereum-like Blockchains

Chao Li and Balaji Palanisamy

CWS_REG_180

An Auction-based Incentive Mechanism with Blockchain for IoT Collaboration

Guanjie Cheng, Shuiguang Deng, Zhengzhe Xiang, Yan Chen and Jianwei Yin

Tuesday 10/20, 02:40 - 04:00

ICWS Session 2: Crowdsourcing

Session Chair: Shuiguang Deng, Zhejiang University

CWS_REG_276

Affinitive Diversity-aware Task Allocation in Spatial Crowdsourcing

Shahzad Sarwar Bhatti, Yiding Chang, Xiaofeng Gao and Guihai Chen

CWS_REG_106

PB-Worker: A Novel Participating Behavior-based Worker Ability Model for General Tasks on Crowdsourcing Platforms

Qianli Xing, Weiliang Zhao, Jian Wang, Jia Wu and Qi Wang

CWS_SHT_309

Answer Aggregation for Crowdsourcing Microtasks using Approximate Global Optimal Searching

Lizhen Cui, Jing Chen, Wei He and Wei Guo

Tuesday 10/20, 07:00 - 08:20

ICWS Session 3: QoS

Session Chair: Elena Ferrari, University of Insubria

CWS_REG_87

Signature-based Selection of IaaS Cloud Services

Sheik Mohammad Mostakim Fattah, Athman Bouguettaya and Sajib Mistry

CWS_REG_297

Integrating EMD with Multivariate LSTM for Time Series QoS Prediction

Xiuqing Chen, Bing Li, Jian Wang, Yuqi Zhao and Yiming Xiong

CWS_REG_117

Distance-aware Edge User Allocation with QoE Optimization

Zhiwei Xu, Guobing Zou, Xiaoyu Xia, Ya Liu, Yanlan Gan, Bofeng Zhang and Qiang He

Tuesday 10/20, 14:40 - 16:00

ICWS Plenary Panel

Software Service Engineering and Its Ecosystem Evolution

Panel Chair: Elena Ferrari, University of Insubria

Panelists:

Dinesh Verma, IBM TJ Watson Research Center

Xiao Xue, Tianjin University

Xin Peng, Fudan University

Jia Zhang, Southern Methodist University

As software services become ubiquitous in all industry domains and markets, agility- ability to quickly responding to changes, fast time to market, security, as well as cost reduction becomes the dominant constraints. Emerging application areas, such as intelligent medical applications, smart cities, cyber manufacturing and intelligent resources/energy management requires the development of services with self-awareness, self-adaption or auto-healing behaviors, with low human intervention. At the same time, the advances in artificial intelligence and machine learning techniques can be exploited to empower software and service engineers with intelligent software development tools and technologies. The novel software development and delivery practices (e.g., DevOps, DecSecOps, and more recently, AIOps, and ModelOps) and their related ecosystems are now becoming mainstream techniques. But are they enough? And how easily can their potential be exploited in big companies and in SMEs?

The panelists will discuss new developments and future challenges in this area from their perspective, by addressing the following issues (as well as others raised by the audience):

What are the strengths and weaknesses of existing approaches?

What do you view as the most important issues that need to be solved in the near future?

What are some key use-cases from industry and academic perspectives?

Tuesday 10/20, 19:00 - 20:20

ICWS Session 4: Security & Privacy

Session Chair: Jacek Kitowski, AGH University of Science & Technology

CWS_REG_209

GDPR: When the Right to Access Personal Data Becomes a Threat

Luca Bufalieri, Massimo La Morgia, Alessandro Mei and Julinda Stefa

CWS_SHT_334

METING: A Robust Log Parser Based on Frequent n-Gram Mining

Oihana Coustie, Xavier Baril, Josiane MOthe and Teste Olivier

CWS_SHT_284

Running Transactional Business Processes with Blockchain's Smart Contracts

Amina Brahem, Nizar Messai, Yacine Sam, Sami Bhiri, Thomas Devogele and Walid Gaaloul

Tuesday 10/20, 20:40 - 22:00

ICWS Session 5: Service Management

Session Chair: Jia Zhang, Southern Methodist University

CWS_REG_326

A Simulation-based Comparison between Industrial Autoscaling Solutions and COCOS for Cloud Applications

Luciano Baresi and Giovanni Quattrocchi

CWS_REG_323

On the Maintenance of a Scientific Application based on Microservices: An Experience Report

Leonardo Pondian Tizzei, Leonardo Guerreiro Azevedo, Elton Soares, Raphael Melo Thiago and Rodrigo Costa

CWS_REG_339

Location-aware and Budget-constrained Application Replication and Deployment in Multi-Cloud Environment

Tao Shi, Hui Ma, Gang Chen and Sven Hartmann

Wednesday 10/21, 01:00 - 02:20

ICWS Session 6: Recommendation

Session Chair: Jun Wei, Institute of Software, Chinese Academy of Sciences

CWS_REG_28

A Co-Attention Model with Sequential Behaviors and Side Information for Session-based Recommendation

Lin Li, Yuliang Shi, Kun Zhang and Yongjian Ren

CWS_REG_89

POEM: Position Order Enhanced Model for Session-based Recommendation Service

Mingyou Sun, Jiahao Yuan, Zihan Song, Yuanyuan Jin, Xingjian Lu and Xiaoling Wang

CWS_REG_228

MR_UI: A Mobile Application Recommendation Based on User Interaction

Junjie Chen, Buqing Cao, Jianxun Liu and Bing Li

Wednesday 10/21, 02:40 - 04:00

ICWS Session 7: Microservice

Session Chair: Bing Li, Wuhan University

CWS_REG_35

Root-Cause Metric Location for Microservice Systems via Log Anomaly Detection

Lingzhi Wang, Nengwen Zhao, Junjie Chen, Pinnong Li, Wenchi Zhang and Kaixin Sui

CWS_REG_196

Fitness-guided Resilience Testing of Microservice-based Applications

Zhenyue Long, Guoquan Wu, Xiaojiang Chen, Chengxu Cui, Wei Chen and Jun Wei

Wednesday 10/21, 07:00 - 08:20

ICWS Session 8: Deep Learning in Services Computing

Session Chair: Shangguang Wang, Beijing University of Posts and Telecommunications

CWS_REG_9

Multi-Agent Deep Reinforcement Learning Based Price Strategy for Competing Cloud Platforms in the Evolutionary Market

Bing Shi, Rongjian Shi and Bingzhen Li

CWS_REG_340

ServeNet: A Deep Neural Network for Web Services Classification

Yilong Yang, Nafees Qamar, Peng Liu, Katarina Grolinger, Weiru Wang, Zhi Li and Zhifang Liao

CWS_SHT_186

PhishTrim: Fast and Adaptive Phishing Detection Based on Deep Representation Learning

Lei Zhang and Peng Zhang

Wednesday 10/21, 08:40 - 10:00

ICWS Session 9: Mobile Edge Computing

Session Chair: Ansuman Banerjee, Indian Statistical Institute

CWS_REG_109

Cognitive Service in Mobile Edge Computing

Chuntao Ding, Ao Zhou, Xiao Ma and Shangguang Wang

CWS_REG_72

Multivariate QoS Monitoring in Mobile Edge Computing based on Bayesian Classifier and Rough Set

Pengcheng Zhang, Yaling Zhang, Hai Dong and Huiying Jin

CWS_REG_65

Budgeted Data Caching based on k-Median in Mobile Edge Computing

Xiaoyu Xia, Feifei Chen, Guangming Cui, Mohamed Abdelrazek, John Grundy, Hai Jin and Qiang He

Wednesday 10/21, 20:40 - 22:00

ICWS Session 10: Service Applications Beyond the Web

Session Chair: Sandro Morasca, University of Insubria

CWS_REG_58

A Multi-Stage Approach for Virtual Network Function Migration and Service Function Chain Reconfiguration in NFV-enabled Networks

Biyi Li, Bo Cheng and Jun-Liang Chen

CWS_REG_273

Joint Availability and Traffic-aware Placement of Parallelized Service Chain in NFV-enabled Data Center

Meng Wang, Bo Cheng and Junliang Chen

CWS_REG_224

A Conflict Detection Framework for IoT Services in Multi-resident Smart Homes

Dipankar Chaki, Athman Bouguettaya and Sajib Mistry

Thursday 10/22, 01:00 - 02:20

ICWS Session 11: Service Recommendation

Session Chair: Xue Xiao, Tianjin University

CWS_REG_32

Location-Aware Feature Interaction Learning for Web Service Recommendation

Zhixin Wang, Yingyuan Xiao, Chenchen Sun, Wenguang Zheng and Xu Jiao

CWS_REG_102

A Category Aware Non-negative Matrix Factorization Approach for App Permission Recommendation

Xiaocao Hu, Lili Lu and Haoyang Wu

Thursday 10/22, 02:40 - 04:00

ICWS Session 12: Evaluation & Planning

Session Chair: Zhongjie Wang, Harbin Institute of Technology

CWS_REG_55

Ordinal Preferences Driven Reputation Measurement for Online Services with User Incentive

Xiaodong Fu, Kun Yue, Li Liu, Lijun Liu, and Yong Feng

CWS_REG_112

FATP: Fairness-Aware Task Planning in Spatial Crowdsourcing

Jing Lan, Yu Shao, Xiaofeng Gao and Guihai Chen

CWS_REG_283

An Integrative Multi-Dimensional Evaluation of Service Ecosystem

Xiao Xue, Zhaojie Chen, Shizhan Chen and Binjie Li

Thursday 10/22, 13:00 - 14:20

ICWS Session 13: Semantic Services

Session Chair: Zhangbing Zhou, CUG Beijing

CWS_REG_97

User Intention Recognition and Requirement Elicitation Method for Conversational AI Services

Junrui Tian, Zhiying Tu, Zhongjie Wang, Xiaofei Xu and Min Liu

CWS_REG_341

A Novel Dual-Graph Convolutional Network Based Web Service Classification Framework

Xin Wang, Jin Liu, Xiao Liu, Xiaohui Cui and Hao Wu

CWS_SHT_110

A Big Service with Network Represent Learning for Quantified Flight Delay Prediction

Ziyu Guo, Guangxu Mei, Lei Bian, Hongwu Tang, Diansheng Wang, Li Pan and Shijun Liu

Thursday 10/22, 14:40 - 16:00

ICWS Session 14: Edge Computing

Session Chair: Wolf Zimmerman, Martin Luther University Halle-Wittenberg

CWS_REG_59

A Decentralized Collaborative Approach to Online Edge User Allocation in Edge Computing

Qinglan Peng, Yunni Xia, Yan Wang, Chunrong Wu and Jia Lee

CWS_REG_68

Security-aware QoS Forecasting in Mobile Edge Computing based on Federated Learning

Huiying Jin, Pengcheng Zhang and Hai Dong

CWS_REG_172

Trace-driven Modeling and Verification of a Mobility-Aware Service Allocation and Migration Policy for Mobile Edge Computing

Kaustabha Ray and Ansuman Banerjee

Thursday 10/22, 19:00 - 20:20

ICWS Session 15: Service Discovery & Composition

Session Chair: Barbara Carminati, University of Insubria

CWS_REG_74

Computing Admissible Temporal SLAs for Web Service Compositions

Marco Franceschetti and Johann Eder

CWS_WIP_125

A Self-Organising Multi-Agent Knowledge Base

Stefan Jakob, Alexander Jahl, Harun Baraki and Kurt Geihs

Friday 10/23, 01:00 - 02:20

IWSC Session 16: Service Recommendation

Session Chair: Jian Cao, Shanghai Jiao Tong University

CWS_REG_33

NAFM: Neural and Attentional Factorization Machine for Web API Recommendation

Guosheng Kang, Jianxun Liu, Buqing Cao and Manliang Cao

CWS_REG_194

A-HSG: Neural Attentive Service Recommendation based on High-order Social Graph

Chunyu Wei, Yushun Fan, Jia Zhang and Haozhe Lin

CWS_REG_337

Time-aware Service Recommendation Based on Dynamic Preference and QoS

Yanmei Zhang, Zhuo Li, Xiaoyi Tang and Fu Chen

Friday 10/23, 02:40 - 04:00

ICWS Session 17: Security & Privacy

Session Chair: Jianwei Yin, Zhejiang University

CWS_REG_77

A Practical Defense Against Attribute Inference Attacks in Session-based Recommendations

Yifei Zhang, Neng Gao and Junsha Chen

CWS_REG_81

WGT: Thwarting Web Attacks Through Web Gene Tree-based Moving Target Defense

Yaqin Zhang, Duohe Ma, Xiaoyan Sun, Kai Chen and Feng Liu

Friday 10/23, 07:00 - 08:20

ICWS Session 18: Edge and Mobile Computing

Session Chair: Qiang He, Swinburne University of Technology

CWS_REG_219

Dynamic Task Offloading with Minority Game for Internet of Vehicles in Cloud-Edge Computing

Bowen Shen, Xiaolong Xu, Fei Dai, Lianyong Qi, Xuyun Zhang and Wanchun Dou

CWS_REG_220

Computation Offloading and Content Caching with Traffic Flow Prediction for Internet of Vehicles Edge Computing

Zijie Fang, Xiaolong Xu, Fei Dai, Lianyong Qi, Xuyun Zhang and Wanchun Dou

CWS_SHT_286

Leveraging Social Networks to Enhance Effective Coverage for Mobile Crowdsensing
Wei Liu and Xiaofeng Gao

Friday 10/23, 08:40 - 10:00

ICWS Session 19: Analysis & Resource Allocation

Session Chair: Hui Ma, Victoria University Wellington

CWS_REG_123

Computing Power Allocation and Traffic Scheduling for Edge Service Provisioning
Zhengzhe Xiang, Shuiguang Deng, Fangqiao Jiang, Javid Taheri and Jianwei Yin

CWS_REG_310

ORHRC: Optimized Recommendations of Heterogeneous Resource Configurations in Cloud-Fog Orchestrated Computing Environments

Ai Xiao, Zhihui Lu, Jie Wu, Xin Du and Patrick C.K. Hung

CWS_SHT_129

Investigating the Evolution of Web API Cooperative Communities in the Mashup Ecosystem
Qing Qi and Jian Cao

Friday 10/23, 14:40 - 16:00

ICWS Session 20: Business Process Management

Session Chair: Chouki Tibermacine, LIRMM, CNRS, Montpellier University

CWS_SHT_60

Detecting Temporal Anomaly and Interestingness in Timed Business Process Models
Deng Zhao, Zhangbing Zhou, Yasha Wang and Walid Gaaloul

CWS_SHT_92

Hierarchical Business Process Discovery: Identifying Sub-processes Using Lifecycle Information
Cong Liu

CWS_SHT_140

A-BPS: Automatic Business Process Discovery Service using Ordered Neurons LSTM
Xue Han, Lianxue Hu, Lijun Mei, Yabin Dang, Shivali Agarwal, Xin Zhou and Pengwei Hu

Saturday 10/24, 01:00 - 02:20

ICWS Session 21: Service Discovery, Selection & Composition

Session Chair: Incheon Paik, University of Aizu

CWS_REG_107

bi-HPTM: An Effective Semantic Matchmaking Model for Web Service Discovery
Shuangyin Li, Haoyu Luo and Gansen Zhao

CWS_REG_236

Swarm-based Drone-as-a-Service (SDaaS) for Delivery
Balsam Alkouz, Athman Bouguettaya and Sajib Mistry

CWS_SHT_325

A Game-Theoretic Drone-as-a-Service Composition for Delivery
Babar Shahzaad, Athman Bouguettaya and Sajib Mistry

Saturday 10/24, 02:40 - 04:00

ICWS Session 22: IoT Service

Session Chair: Liang Zhang, Fudan University

CWS_REG_118

Efficient Search for Moving Object Devices in Internet of Things Networks

Jine Tang, Xiao Xue, Sami Yangui and Zhangbing Zhou

CWS_SHT_116

Event Detection on Monitoring Internet of Things Services by Fusing Multiple Observations

Yang Zhang and Bo Cheng

CWS_SHT_289

IoT Services Configuration in Edge-Cloud Collaboration Networks

Mengyu Sun and Zhangbing Zhou

Saturday 10/24, 07:00 - 08:20

ICWS Session 23: Service Oriented Software Engineering

Session Chair: Xuanzhe Liu, Peking University

CWS_REG_294

BrowserVM: Running Unmodified Operating Systems and Applications in Browsers

Elliot Wen

CWS_REG_249

Lead Time-Aware Proactive Adaptation for Service-Oriented Systems

Jingbin Zhang, Meng Ma and Ping Wang

CWS_REG_263

A-SARSA: A Predictive Container Auto-Scaling Algorithm Based on Reinforcement Learning

Shubo Zhang, Tianyang Wu, Maolin Pan, Chaomeng Zhang and Yang Yu

Saturday 10/24, 08:40 - 10:00

ICWS Session 24: Services Applications

Session Chair: Xiao Liu, Deakin University

CWS_REG_153

A Novel Data Placement Strategy for Data-Sharing Scientific Workflows in Heterogeneous Edge-Cloud Computing Environments

Xin Du, Songtao Tang, Zhihui Lu, Jie Wu, Keke Gai and Patrick C.K. Hung

CWS_REG_346

PrTaurus: An Availability-Enhanced EMR Service on Preemptible Cloud Instances

Junming Ma, Yan Li, Xiangqun Chen and Donggang Cao

CWS_REG_354

An Attention-based Neural Model for Popularity Prediction in Social Service

Chao Wang, Weizhi Gong, Xiaofeng Gao and Guihai Chen

Saturday 10/24, 13:00 - 14:20

ICWS Session 25: Recommendation

Session Chair: Massimo Mecella, Sapienza Universita di Roma

CWS_REG_259

Enhancing Cross-domain Recommendation through Preference Structure Information Sharing
Nengjun Zhu and Jian Cao

CWS_REG_260

Latent Group Recommendation based on Double Fuzzy Clustering and Matrix Tri-factorization
Haiyan Wang, Jinxia Zhu and Zhousheng Wang

CWS_REG_306

Structure Reinforcing and Attribute Weakening Network based API Recommendation Approach for Mashup Creation
Yong Xiao, Jianxun Liu, Guosheng Kang, Rong Hu, Buqing Cao, Yingcheng Cao and Min Shi

Saturday 10/24, 13:00 - 14:20

ICWS Session 26: Prediction

Session Chair: Mengchu Zhou, New Jersey Institute of Technology

CWS_SHT_146

Efficient and Privacy-Preserving Federated QoS Prediction for Cloud Services
Yilei Zhang, Peiyun Zhang, Yonglong Luo and Jun Luo

CWS_SHT_187

Remaining Time Prediction of Business Processes based on Multilayer Machine Learning
Xiaoxiao Sun, Wenjie Hou, Yuke Ying and Dongjin Yu

CWS_SHT_279

A Deep Concept-aware Model for predicting and explaining restaurant future status
Hao Liao, Xiaojie Zhang, Xin Li, Alexandre Vidmer, Mingyang Zhou and Rui Mao

IEEE International Conference on Services Computing (SCC 2020)

Message from the Chairs



Xiaofei Xu
Harbin Institute of
Technology
General Chair

A warm welcome to the 2020 IEEE International Conference on Services Computing (SCC), an affiliated conference of IEEE World Congress on Services (SERVICES). Due to the extraordinary circumstances we face globally this year, all IEEE SERVICES affiliated conferences will be held as all-virtual events in the cloud for the first time on October 19 to 23. We look forward to a safe, highly productive, and engaging digital conference with an SCC organized IEEE SERVICES plenary panel, Symposium on Future of Financial Services (FFS), and many other technical sessions spanning ten research areas of services computing.



Kumar Bhaskaran
IBM Research
General Chair

Enterprises, industries and entire economies are accelerating their shift to the evolving digital world. Real world systems, be it business, IT, and/or physical infrastructures, are rapidly converging as part of such a digital fabric and consumed as modern services. The future of services – that serve as the digital foundation for the world we inhabit – is built on a scientific foundation that includes advanced computing, intelligent automation, new models of data privacy and trust, and scalable digital platforms and technologies engaging an ecosystem of market participants and technology solutions providers. In IEEE SCC 2020, we explore the advances in scientific foundations of modern digital services, service science and engineering, and share the work of the global research community in serviceology and the foundations of services computing, how AI is being deployed at scale, choreographed by scientific workflows and business process management, and delivered as microservices with digital service composition in support of API economies. Such services will need to meet the QoS expectations and be managed over its lifecycle. We also feature topical areas of interest such as the Internet of Things, Internet of Services, Enterprise services, Service-oriented Education, and Services verticals including innovative service applications in Health Care and Financial Services.



Jia Zhang
Southern
Methodist
University
Program Chair

Program Committee of IEEE SCC 2020 comprises 177 experts from 27 countries. About 200 papers in total over two rounds were submitted. After a rigorous review process, we accepted 41 full research papers (with acceptance rate 20.5%), 11 Research Workshop papers, 14 Work-in-Progress papers and 2 in-conference symposium papers. SCC 2020 will also feature a plenary panel at IEEE SERVICES 2020, titled “Serviceology: Advancing Scientific Foundations for Modern Digital Services,” with leading experts from the industry and academia as the panelists. We introduced the Future of Financial Services symposium in 2019 in Milan and will debut its 2nd year in 2020 with distinguished talks and focused research presentations covering advances in science such as Quantum Finance and in technology such as how the FinTech is revitalizing the industry.



Luciano Baresi
Politecnico of Milan
Program Chair

We would like to thank the researchers who submitted their papers to the conference and the program committee members for reviewing the submissions rigorously under challenging circumstances. We would also like to take this opportunity to express our appreciation to several IEEE SERVICES 2020 leaders for their dedication to the event: (Steering Committee Chair) Prof. Carl Chang, (Honorary General Chair) Stephen Yau and Peter Chen; (General Chair in Chief) Elisa Bertino and Hong Mei; (Program Chair in Chief) Ernesto Damiani, and Zhi Jin; and (Symposia General Chair) Rong N. Chang. They made it possible to bring you IEEE SCC 2020.



Jianwei Yin
Zhejiang University
Program Chair

We look forward to engaging with all of you at IEEE SCC 2020 and enjoying inspiring discussions on how to advance the scientific foundations for modern digital services.

SCC 2020

The 2020 IEEE International Conference on Services Computing Technical Program

All times are listed in UTC time.
To convert UTC time to your time, use the [UTC Time Zone Converter](#).

The SCC conference program includes the IEEE 2nd Future of Financial Services Symposium.

Tuesday 10/20, 01:00 - 02:20

SCC 1: Foundations of Service Computing and Serviceology/Services Science

Session Chair: Frank Liu, Southern Illinois University

SCC_REG_166

A Framework for Situation-aware Access Control in Federated Data-as-a-Service Systems Based on Query Rewriting

Samson Oni, Zhiyuan Chen, Adina Crainiceanu, Donald Needham and Karuna Joshi

SCC_REG_126

Research on the Synecological Model and Dynamic Evolution Mechanism of Service Internet

Zhixuan Jia, Shuangxi Huang and Yushun Fan

SCC_REG_170

A Scenario-based Modeling Method for Crossover Services

Meng Xi, Jianwei Yin, Yongna Wei, Maolin Zhang, Shuiguang Deng and Ying Li

SCC_REG_67

Bringing Semantics to Support Ocean FAIR Data Services with Ontologies

Xiaoli Ren, Xiaoyong Li, Kefeng Deng, Kaijun Ren, Aolong Zhou and Junqiang Song

SCC_REG_191

Service Pattern Modeling and Simulation: A Case Study of Rural Taobao

Jintao Che, Jianwei Yin, Meng Xi, Siwei Tan, Yongna Wei and Shuiguang Deng

Tuesday 10/20, 02:40 - 04:00

SCC 2: SCC Work-in-Progress Papers

Session Chair: Honghao Gao, Shanghai University

SCC_WIP_20

A Swarm-based Approach for Function Placement in Federated Edges

Andrei Palade, Atri Mukhopadhyay, Aqeel Kazmi, Christian Cabrera, Evelyn Nomayo, Georgios Iosifidis, Marco Ruffini and Siobhan Clarke

SCC_WIP_49

A Pre-joined Service Composition Approach with Dynamic Services in a Graph Database

Jing Li, Ming Zhu, Miao Yu, Yuhong Yan and Lizhen Cui

SCC_WIP_94

Personality Traits Prediction Based on Users' Digital Footprints in Social Networks via Attention RNN

Shipeng Wang, Lizhen Cui, Lei Liu, Xudong Lu and Qingzhong Li

SCC_WIP_106

Characterizing Service Access Patterns under Heterogeneous Clients

Shuyu Zheng, Fuqi Lin, Xuan Lu, Yulian Yang, Hongfei Deng, Jun Zhang, Yun Ma and Xuanzhe Liu

Tuesday 10/20, 07:00 - 08:20

SCC 3: AI@Scale in Services Computing

Session Chair: Supratik Mukhopadhyay, Louisiana State University

SCC_REG_137

BSE-MAML: Model Agnostic Meta-Reinforcement Learning via Bayesian Structured Exploration

Haonan Wang, Yiyun Zhang, Dawei Feng, Dongsheng Li and Feng Huang

SCC_REG_138

The Research of Link Prediction in Knowledge Graph based on Distance Constraint

Linlu Wei and Fangfang Liu

SCC_REG_145

D-colSimulation: A Distributed Approach for Frequent Graph Pattern Mining based on colSimulation in a Single Large Graph

Guanqi Hua, Lizhen Cui, Junhua Zhang, Wei Guo, Xudong Lu and Wei He

Tuesday 10/20, 19:00 - 20:20

SCC 4: AI@Scale in Services Computing

Session Chair: Jorge Sanz, IBM TJ Watson Research Center

SCC_REG_146

MLP4ML: Machine Learning Service Recommendation System using MLP

Bayan Alghofaily and Chen Ding

SCC_REG_196

A Knowledge Graph Approach to Mashup Tag Recommendation

Benjamin Kwapong, Richard Anarfi and Kenneth Fletcher

SCC_REG_48

Graph Neural Network and Multi-view Learning Based Mobile Application Recommendation in Heterogeneous Graphs

Fenfang Xie, Zengxu Cao, Yangjun Xu, Liang Chen and Zibin Zheng

Tuesday 10/20, 20:40 - 22:00

SCC 5: SCC Research Workshop

Session Chair: Antonio Bucchiarone, FBK-IRST

SCC_WSP_199

SEED: Confidential Big Data Workflow Scheduling with Intel SGX Under Deadline Constraints

Ishtiaq Ahmed, Saeid Mofrad, Shiyong Lu, Changxin Bai, Fengwei Zhang and Dunren Che

SCC_WSP_194

OpenDT: A Reference Framework for Service Publication and Discovery Using Remote Programmable Digital Twins

Md Rakib Shahriar, Frank Liu, Md Mahfuzer Rahman and S M Nahian Al Sunny

SCC_WSP_189

Integrated Topic Modeling and User Interaction Enhanced WebAPI Recommendation using Regularized Matrix Factorization for Mashup Application Development

Md Mahfuzer Rahman and Xiaoqing Frank Liu

Wednesday 10/21, 01:00 - 02:20

SCC 6: Scientific Workflows & Business Process Integration and Management

Session Chair: Zongjie Wang, Harbin Institute of Technology

SCC_REG_92

A Survey of Modern Scientific Workflow Scheduling Algorithms and Systems in the Era of Big Data

Junwen Liu, Shiyong Lu and Dunren Che

SCC_REG_132

Data Provenance for Complex Event Processing Invoking Composition of Services

Malik Khalfallah and Parisa Ghodous

SCC_REG_188

A Meta Model for Mining Processes from Email Data

Marwa Elleuch, Nour Assy, Nassim Laga, Walid Gaaloul, Oumaima Alaoui Ismaili and Boualem Benatallah

Wednesday 10/21, 02:40 - 04:00

SCC 7: Scientific Workflows & Business Process Integration and Management

Session Chair: Kenneth Fletcher, University of Massachusetts Boston

SCC_REG_131

A Predictive-Trend-Aware and Critical-Path-Estimation Based Method for Workflow Scheduling Upon Cloud Services

Yi Pan, Xiaoning Sun, Yunni Xia, Wanbo Zheng and Xin Luo

SCC_REG_184

Bootstrapping Natural Language Querying on Process Automation Data

Xue Han, Lianxue Hu, Jaydeep Sen, Ya Bin Dang, Bu Yu Gao, Vatche Isahagian, Chuan Lei, Vasilis Efthymiou, Fatma Ozcan, Abdul Quamar, Ziming Huang and Vinod Muthusamy

SCC_REG_204

A Process Convergence Approach for Crossover Services based on Message Flow Partition and Merging

Yiwei Shan, Yu Qiao, Bing Li and Jian Wang

Wednesday 10/21, 07:00 - 08:20

SCC 8: API Economy, Microservices, and Digital Service Composition

Session Chair: Zhiying Tu, Harbin Institute of Technology

SCC_REG_130

Survey on Requirement-Driven Microservice System Evolution

Zhongjie Wang, Xiang He, Lei Liu, Zhiying Tu and Hanchuan Xu

SCC_REG_133

MV4MS: A Spring Cloud based Framework for the Co-Deployment of Multi-Version Microservices

Lei Liu, Xiang He, Zhiying Tu and Zhongjie Wang

SCC_REG_134

Selection of Cloud Service Providers for Hosting Web Applications in a Multi-cloud Environment

Arun Ramamurthy, Saket Saurabh, Mangesh Gharote and Sachin Lodha

Wednesday 10/21, 08:40 - 10:00

SCC 9: Service QoS, Lifecycle Management and DevOps

Session Chair: Hui Ma, Victoria University of Wellington

SCC_REG_185

Event-based Detection of Changes in IaaS Performance Signatures
Sheik Mohammad Mostakim Fattah and Athman Bouguettaya

SCC_REG_147

Dynamic Task Allocation for Cost-Efficient Edge Cloud Computing
Shiyao Ding and Donghui Lin

SCC_REG_135

PETA: Privacy Enabled Task Allocation

Nitin Ganesh Phuke, Saket Kumar Saurabh, Mangesh Sharad Gharote and Sachin P. Lodha

SCC_REG_42

A Temporal-Spatial-Domain Distribution Model and Alignment Method for Quality Attributes
Zhongjie Wang, Min Li and Zhiying Tu

Wednesday 10/21, 20:40 - 22:00

SCC 10: SCC Research Workshop

Session Chair: Flavio De Paoli, Universita Milano Bicocca

SCC_WSP_201

Seeding-Based Multi-Objective Evolutionary Algorithms for Multi-Cloud Composite Applications
Deployment
Tao Shi, Hui Ma and Gang Chen

SCC_WSP_181

A Distance-based Genetic Algorithm for Robust Data-intensive Web Service Composition in
Dynamic Bandwidth Environment
Soheila Sadeghram, Hui Ma and Gang Chen

SCC_WSP_155

GPSO: A Graph-based Heuristic Algorithm for Service Function Chain Placement in Data Center
Networks
Meng Niu, Bo Cheng and Jun-Liang Chen

SCC_WSP_165

Analytics on Health of Mobile Software Ecosystem Based on the Internal Operating Mechanism
Jianmao Xiao, Shizhang Chen, Shiping Chen, Chao Gao, Hongyue Wu, Xiao Xue and Zhiyong
Feng

Thursday 10/22, 01:00 - 02:20

SCC 11: Service QoS, Lifecycle Management, and DevOps

Session Chair: Alfredo Goldman, Universidad De SaoPaulo

SCC_REG_54

Credible and Online QoS Prediction for Services in Unreliable Cloud Environment
Yilei Zhang, Xiao Zhang, Peiyun Zhang and Jun Luo

SCC_REG_150

A Reference Method for Performance Evaluation in Big Data Architectures
Wictor Martins, Bruno Kuehne, Rafael Sobrinho and Fabio Preti

SCC_REG_162

Diversified QoS-Centric Service Recommendation for Uncertain QoS Preferences
Guosheng Kang, Jiaxun Liu, Buqing Cao and Yong Xiao

SCC_REG_177

QoS-aware Automatic Service Composition Based on Service Execution Timeline with Multi-objective Optimization
Zhaoning Wang, Bo Cheng, Wenkai Zhang and Jun-Liang Chen

Thursday 10/22, 02:40 - 04:00

SCC 12: Internet of Things as a Service

Session Chair: Qiang He, Swinburne University of Technology

SCC_REG_144

Incentive-based Selection and Composition of IoT Energy Services
Amani Abusafia, Athman Bouguettaya and Sajib Mistry

SCC_REG_149

An IoT-owned Service for Global IoT Device Discovery, Integration and (Re)use
Anas Dawod Alrefaee, Dimitrios Georgakopoulos, Prem Prakash Jayaraman and Ampalavanapillai Nirmalathas

SCC_REG_174

Fine-grained Conflict Detection of IoT Services
Dipankar Chaki and Athman Bouguettaya

SCC_REG_203

Fluid Composition of Intermittent IoT Energy Services
Abdallah Lakhdari and Athman Bouguettaya

Thursday 10/22, 08:40 - 10:00

Plenary Panel: Serviceology: Advancing Scientific Foundations for Modern Digital Services

Panel Chairs:

Kumar Bhaskaran, IBM Research, TJ Watson Research Center

Xiaofei Xu, Harbin Institute of Technology

Digital MC: Sue Ann Chen

Panelists:

Athman Bouguettaya, University of Sydney

Carl K. Chang, Iowa State University

Rong N. Chang, IBM Research, TJ Watson Research Center

Bhavani Thuraisingham, University of Texas at Dallas

Thursday 10/22, 13:00 - 14:20

SCC 13: Enterprise Services and Service Verticals

Session Chair: Fei Fei Li, University of Utah & Alibaba

SCC_REG_43

A Novel Data-to-Text Generation Model with Transformer Planning and a Wasserstein Auto-Encoder
Xiaohong Xu, Ting He and Huazhen Wang

SCC_REG_45

FDA_VeD: A Future-Demand-Aware Vehicle Dispatching Service

Yang Guo, Weiliang Zhao, Jian Yang, Zizhu Zhang, Jia Wu and Tarique Anwar

SCC_REG_48

Graph Neural Network and Multi-view Learning Based Mobile Application Recommendation in Heterogeneous Graphs

Fenfang Xie, Zengxu Cao, Yangjun Xu, Liang Chen and Zibin Zheng

SCC_REG_139

Ponzi Contracts Detection Based on Improved Convolutional neural Network

Yincheng Lou, Yanmei Zhang and Shiping Chen

SCC_REG_157

Suitability-based Task Assignment in Crowdsourcing Markets

Pengwei Wang, Zhen Chen and Zhaohui Zhang

Thursday 10/22, 14:40 - 16:00

SCC 14: Innovative Service Applications and Human-Centered Services

Session Chair: Jun Shen, University of Wollongong

SCC_REG_112

App Competition Matters: How to Identify Your Competitor Apps?

Md Kafil Uddin, Qiang He, Jun Han and Caslon Chua

SCC_REG_116

Blockchain-based Controlled Information Sharing in Inter-organizational Workflows

Barbara Carminati, Elena Ferrari, Christian Rondanini and Federico Daidone

SCC_REG_141

DeepRouting: A Deep Neural Network Approach for Ticket Routing in Expert Network

Jianglei Han and Aixin Sun

SCC_REG_143

Adaptive Request Scheduling for Device Cloud

Han Dong, Enze Xu, Xiang Jing, Huaqian Cai and Gang Huang

SCC_REG_190

User Portraits and Investment Planning Based on Accounting Data

Yibing Wu, Rongxuan Want, Wei Dai, Shixuan Dong, Xiaohe You, Huanxiong You and Lijie Liu

Thursday 10/22, 19:00 - 20:20

Future of Financial Services Symposium - Session 1

Panel: New Frontiers in Financial Services

Session Chair: Jorge Sanz

Panelists:

Manju Seal, Head of Sustainable Finance, Advisory Bank of Montreal Capital Markets Group, NYC

Elena Yndurain, Senior Strategy Consultant

Steven Zhang, Ryerson University

Pavel Rahma, Data+AI Lead, BGS, IBM

Jochen Papenbrock, Financial Technology Customer & Partner Relationship Manager, EMEA-NVIDIA

Thursday Oct 22, 20:40 - 22:00

Future of Financial Services Symposium - Session 2

New Financial Models and Blockchain Applications

Session Chair: Yanmei Zhang

SCC_FFS_212

An Empirical Study of an Open Ecosystem Model for Inclusive Financial Services

Ko-Yang Wang, Grace Lin, Kevin Kuo, Han-Chao Lee, Brick Tsai, Webster Peng

SCC_FFS_209

Detecting Artifact Anomalies in Microservice-based Financial Applications

Faisal Fahmi, Pei-Shu Huang and Feng-Jian Wang

Friday 10/23, 01:00 - 02:20

Future of Financial Services Symposium - Session 3

Panel: Future Financial Services Trends and Opportunities

Panel Chairs: Grace Lin & Ko-Yang Wang

Panelists:

Jin-Chuan Duan, National University of Singapore

Zhaoying liu, Managing Director & Head of Assets Securitization, Agricultural Bank of China

Jason Hsu, Head of Legislative Advocacy, Blockchain & Climate Institute/Co-Chair, Taiwan

FinTech Association

Friday 10/23, 02:40 - 04:00

SCC 15: SCC Research Workshop

Session Chair: Shuiguang Deng, Zhejiang University

SCC_WSP_179

A Blockchain-based Trustworthy Certification Process for Composite Services

Marco Anisetti, Claudio A. Ardagna, Barbara Carminati, Christian Rondanini, Elena Ferrari and

Ernesto Damiani

SCC_WSP_186

Temporal-spatial-domianial Features Oriented Modeling Framework for Transboundary Service

Min Li, Zhiying Tu, Hanchuan Xu and Zhongjie Wang

SCC_WSP_195

Tang Dubhe: A Service Pattern Modeling and Analysis System

Jianwei Yin, Siwei Tan, Meng Xi, Jintao Chen, Yongna Wei and Shuiguang Deng

SCC_WSP_202

Domain Priori Knowledge Based Integrated Solution Design for Internet of Services

Hanchuan Xu, Xiao Wang, Yuxin Wang, Nan Li, Zhiying Tu, Zhongjie Wang and Xiaofei Xu

Friday 10/23, 07:00 - 08:20

SCC 16: SCC Work-in-Progress Papers 2

Session Chair: Honghao Gao, Shanghai University

SCC_WIP_136

Hybrid Architecture for Handwriting Perceptual Service based on Edge Computing

Tonghua Su and Zhongjie Wang

SCC_WIP_154

Multi-factor-based Motion Detection for Server Rack Doors Left Open
Ruriko Kudo, Yasuharu Katsuno and Fumiko Satoh

SCC_WIP_164

Automatic Cross-City API Matching for Urban Service Collaboration based on Semantics
Yongshen Long, Wuqiao Chen, Xutao Li and Yunming Ye

SCC_WIP_198

A Service Computing Framework for Proteomics Analysis and Collaboration of Pathogenic Mechanism Studies
Huaming Chen, Fucun Li, Geng Sun, Xuyun Zhang, Xianjun Dong, Lei Wang, Kewen Liao, Haifeng Shen and Jun Shen

Friday 10/23, 08:40 - 10:00

SCC 17: SCC Work-In-Progress Papers 3

Session Chair: Luciano Baresi, Polytechnic University of Milan

SCC_WIP_169

Summarization of Multidimensional Process Traces for Analysis Under Edit-distance Constraints
Phuong Nguyen, Vatche Ishakian, Vinod Muthusamy and Aleksander Slominski

SCC_WIP_180

Novel EEG Risk Framework to Identify Insider Threats in National Critical Infrastructure Using Deep Learning Techniques
Ahmed Al Hammadi, Chan Yeob Yeun and Ernesto Damiani

SCC_WIP_193

Towards a Methodology for Creating Internet of Things (IoT) Applications based on Microservices
Priscila Cedillo, Paola Pesantes-Cabrera, Edwin Cabrera and Paola Cardenas

SCC_WIP_197

desc2tag: A Reinforcement Learning Approach to Mashup Tag Recommendation
Richard Anarfi, Benjamin Kwabong and Kenneth Fletcher

IEEE International Conference on Smart Data Services (SMDS 2020)

Message from the Chairs



K. Selcuk Candan
Arizona State University
General Chair

We are delighted to welcome you to the IEEE International Conference on Smart Data Services (IEEE SMDS'20), part of the 2020 IEEE World Congress on Services (IEEE SERVICES'20).

IEEE SMDS'20 is the flagship theme-topic conference for data-driven applications and smart data-aware solutions under the as-a-service model, including analytic & learning-based services, smart data infrastructures, big data management, data quality and trustworthiness, data computing at the edge/IoT systems, and case studies of smart data services. IEEE SMDS'20 brings together researchers and practitioners working on AI, Systems, Data Science, and Services Computing to provide a dynamic and interactive forum to present and discuss their latest research findings, results, and challenges in this emerging area of mutual interest.



Tefvik Kosar
University of Buffalo
Program Chair

IEEE SMDS'20 hosts an exciting technical program, including a research papers track, a symposium track including invited papers from leaders in the field, a hackathon, and a plenary panel co-organized with the IEEE Digital Health as a Service Symposium bringing together academic, governmental, and industrial experts in data science, computational epidemiology, security and privacy, and healthcare technologies to focus on the radical shifts needed in smart data and digital health services to respond to challenges posed by COVID-19 in the contexts of epidemiology (e.g., modeling, testing, vaccine development), health and human services (e.g., mixed home-work living, telehealth, uberization of health and social care services, and COVID-proof delivery of health and aging services), and families, communities and

societies (e.g., remote education and online schooling, telework, privacy, governance, community resiliency).

We are immensely grateful to the many researchers who have shaped the conference program. In particular, we thank the authors, presenters, panelists, and the IEEE SMDS'20 program committee. We also extend our appreciation to local organizers Xuanzhe Liu and Leye Wang at Peking University and the student volunteers. We also acknowledge the members of the IEEE Services General Chairs, Elisa Bertino and Hong Mei, Honorary General Chairs, Stephen Yau and Peter Chan, the Organizing Committee members, and the IEEE Services Steering Committee. The committee chair Carl Chang deserves special thanks for providing us with his advice at all stages of the conference organization.

We are also grateful to the EasyChair team for their extremely prompt and helpful support throughout the complex conference reviewing process. (We used the EasyChair platform for the submission and reviewing of research papers) We also give our most sincere thanks to the IEEE CPS team for their immense help in preparing the proceedings for publication.

We thank IEEE SMDS'20 supporters, Alibaba, Baidu, Tencent, JD.com, Huawei, IBM Research, CCF TCSC, and the IEEE Computer Society's Technical Committee on Services Computing (TCSVC), for their many contributions.

SMDS 2020

The 2020 IEEE International Conference on Smart Data Services Technical Program

The SMDS 2020 conference program includes the DHAASS Symposium & PHP Workshop

All times are listed in UTC time.

To convert UTC time to your time, use the [UTC Time Zone Converter](#).

Tuesday 10/20, 01:00 - 02:20

Welcome from the SMDS Chairs (at 12:50 UTC)

SMDS 1: Machine Learning in Data Services

Session Chair: Le Sun, Nanjing University of Information Science & Technology

SMD_INV_61

CNN Approaches to Classify Multivariate Time Series Using Class-specific Features
Huiping Cao

SMD_REG_30

Stargazer: A Deep Learning Approach for Estimating the Performance of Edge-based Clustering Applications
Breno Dantas Cruz, Arnab Kumar Paul, Zheng Song and Eli Tilevich

SMD_REG_24

Machine Learning based User QoE Evaluation for Video Streaming over Mobile Network
Yanhong Zhu, Tao Sun, Qin Li, Lu Lu, Xiaodong Duan and Weiyuan Li

SMD_REG_47

A Latent Feelings-aware RNN Model for User Churn Prediction with only Behavioral Data
Meng Xi, Zhiling Luo, Naibo Wang, Jianrong Tao, Ying Li and Jianwei Yin

Tuesday 10/20, 02:40 - 04:00

SMDS 2: Network & Information Security

Session Chair: Haiyan Wang, Nanjing University of Posts & Telecommunications

SMD_REG_15

BC-Sketch: A Simple Reversible Sketch for Detecting Network Anomalies
Feng Wang, Yongning Tang, Lixin Gao and Guang Cheng

SMD_INV_64

EdgeInfer: Robust Truth Inference under Data Poisoning Attack
Li Xiong

Wednesday 10/21, 01:00 - 02:00

SMDS 3: Knowledge Engineering in Data Services

Session Chair: Li Kuang, Central South University

SMD_REG_65

M2NN: Rare Event Inference through Multi-variate Multi-scale Attention
Manjusha Ravindranath, K. Selcuk Candan and Maria Luisa Sapino

SMD_INV_62

Utber: Utilizing Fine-grained Entity Types to Relation Extraction with Distant Supervision
Lei Chen

SMD_REG_53

Scalable and Hybrid Ensemble-based Causality Discovery
Pei Guo and Jianwu Wang

Wednesday 10/21, 02:20 - 03:40

SMDS 4: Applications & Case Studies

Session Chair: Xiangjuan Cao, China University of Mining & Technology

SMD_REG_19

Geolocation using GAT with Multiview Learning
Zhanyu Wang, Chunyang Ye and Hui Zhou

SMD_REG_21

Multi-objective Reinforcement Learning Based Approach for User-Centric Power Optimization in Smart Home Environments
Saurabh Gupta, Siddhant Bhambri, Karan Dhingra, Arun Balaji Buduru and Ponnurangam

SMD_REG_58

Real-time System for Short- and Long-Term Prediction of Vehicle Flow
Paolo Nesi, Stefano Bilotta and Irene Paoli

SMD_INV_63

MY-AIR: A Personalized Air Quality Information Service
Ouri Wolfson

Wednesday Oct 21 , 02:40 - 04:00

DHS 1/PHP: Digital Health Care & Big Data

Part of the [DHAASS/PHP Workshop/SMDS Symposium](#)

Session Chair: Jaejoon Lee, University of East Anglia

DHS_WIP_001

A Low-vision Navigation Platform for Economies in Transition Countries
John-Ross Rizzo, Chen Feng, Wachara Riewpaiboon, Pattanasak Mongkolwat

DHS_SHT_003

ViewBovine: A Microservices-powered Web Application to Support Interactive Investigation of Bovine Tuberculosis Infection Pathways
Fan Yang-Turner, Denis Volk

PHP_REG_012

A Case Study in Smart Healthcare Platform Design
Valerio Bellandi, Paolo Ceravolo and Maryam Ehsanpour

Wednesday 10/21, 14:40 - 16:00

Plenary Panel

Smart Data & Digital Health Services Beyond COVID19

Part of the [DHAASS/PHP Workshop/SMDS Symposium](#)

Panel Chair: K. Selcuk Candan, Arizona State University

Panelists:

Gerardo Chowell, Georgia State University

Ernesto Damiani, Università degli Studi di Milano

Murat Kantarcioglu, University of Texas at Dallas

Balarishnan Prabhakaran, National Science Foundation

Ajay Royyuru, IBM Research

Wednesday 10/21, 19:00 - 20:40

Keynote 3: Digital Health and Beyond: What Computing Can Do to Transform Health

Wendy Nilsen, National Science Foundation

followed by

Plenary Panel

The Future of Home, School & Office in the Age of Pandemic

Part of the [DHAASS/PHP Workshop/SMDs Symposium](#)

Session & Panel Chair: Sheikh Iqbal Ahamed, Marquette University

Panelists:

Wendy Nilsen, National Science Foundation

Cheng-Chung (William) Chu, Tunghai University

Hemant Jain, The University of Tennessee-Chatanooga

Michael Zimmer, Marquette University

Kathy Chang, University of New Mexico and Engeye

Wednesday Oct 21, 20:40 - 22:00

DHS 2: Dependable Digital Health Platforms

Part of the [DHAASS/PHP Workshop/SMDs Symposium](#)

Session Chair: Pattanasak Mongkolwat, Mahidol University

DHS_INV_005

A Markov Model to Detect Sensor Failure in IoT Environments

Sam Moore, Chris Nugent, Ian Cleland, Shuai Zhang, Sadiq Sani and Alex Healing

DHS_INV_006

R-Mon: An mHealth Tool for Real-time Respiratory Monitoring During Pandemics and Self-isolation

Sheikh Ahamed, Maria Valero and Hossain Shahriar

DHS_INV_007

Situation-driven Context-aware Safety Model for Risk Mitigation Using LTL in a Smart Home Environment

Oluwafemi Oyeleke, Carl K. Chang and Jennifer Margrett

Thursday 10/22, 01:00 - 02:20

SMDs 5: Data Science

Session Chair: Min Yuan, Nanjing Normal University

SMD_REG_11

Conflict-free Replicated Relations for Multi-synchronous Database Management at Edge

Weihai Yu and Claudia-Levinia Ignat

SMD_INV_60

High Performance Data Engineering Everywhere

Chathura Widanage, Niranda Perera, Vibhatha Abeykoon, Supun Kamburugamuve, Thejaka Kanewala, Hasara Maithree, Pulasthi Wickramasinghe, Ahmet Uyar, Gurhan Gunduz and Geoffrey Fox

SMD_REG_34

S3QLRDF: Property Table Partitioning Scheme for Distributed SPARQL Querying of Large-scale RDF Data

Mahmudul Hassan and Srividya Bansal

The Second IEEE SERVICES Workshop on Network Services (NS) Technical Program

All times are listed in UTC time.

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Monday 10/19, 08:40 - 10:00

Network Services 1: Web Service & Recommendation

Session Chair: Yan Guo, Beijing University of Posts & Telecommunications

ACS-Communicator: A Low-cost Customer Service Oriented Communication Framework for E-Commerce Businesses

Suli Wang, Zhaorong Ni, Guobao You, Jun Huang, Xidong Ren and Min Fu

Context-Aware Restaurant Recommendation for Group of People

Qiliang Zhu and Lei Wang

Service Orchestration for Integrating Edge Computing and 5G Network: State of the Art and Challenges

Yan Guo, Qiang Duan and Shangguang Wang

Monday 10/19, 14:40 - 16:00

Network Services 2: Service Providing In Mobile Edge Computing

Session Chair: Junna Zhang, Henan Normal University

A Situation Enabled Framework for Energy-efficient Workload Offloading in 5G Vehicular Edge Computing

Chen-Yeou Yu, Carl Chang and Wensheng Zhang

Availability-aware Service Function Chain Placement in Mobile Edge Computing

Xiaohan Yin, Bo Cheng, Meng Wang and Jun-Liang Chen

An Overview of User-oriented Computation Offloading in Mobile Edge Computing

Junna Zhang and Xiaoyan Zhao

Message from General Chairs of IEEE AISA 2020



Wenjun Wu
Beihang University
AISA General Co-Chair

It is our great pleasure to welcome you to the First IEEE Services Workshop on Artificial Intelligence and Services Adaption, AISA 2020, held in Beijing, the capital of China. The workshop was co-located with the IEEE World Congress on Services 2020, the major international venue in services computing and applications, through which we hope to widen our community and welcome many new faces.

With the continuous emergence of new service technologies such as RESTful and microservices, service software has evolved from a simple homogeneous system to a service ecosystem with an open environment, cross-domain scenarios, and complex business. Traditional service theories and technologies based on WS-* framework are experiencing difficulties in achieving precise services adaption, dynamic composition and coupling integration between massive heterogeneous services. In response to new service adaptation requirements, intelligent service adaptation theory and methods need to be studied to solve the problems including: how to effectively and intelligently adapt heterogeneous services and how to assure the QoS during service evolution and operation.



Huajun Chen
Zhejiang University
AISA General Co-Chair

The purpose of this workshop, AISA 2020, is to support the expanding community by providing a unique forum where novel – and indeed, revolutionary - ideas can be proposed, by facilitating discussions on the directions we are taking as a community, and by welcoming students who are the newest members of our community. The program includes three sessions: Micro Service QoS and Reliability, Service Composition and Workflow, and Microservice Over Cloud. Topics covered includes: (1) theoretical model and computational framework; (2) adaptation process enabling technology; (3) services evolution, efficiency evaluation and optimization; (4) intelligent service adaptation tools and platform; (5) real-world application of intelligent service adaptation.

AISA 2020 aims to bring together world-leading researchers and industrial practitioners from communities as Artificial Intelligence and Services Adaption. The organization was the result of a collective effort and as General Chairs of the workshop we are grateful to all the people who contributed. It was our pleasure to have the possibility of working with them. We would like to express our gratitude to the authors for submitting high-quality papers with many novel and exciting ideas. We would also like to thank the program committee members and the additional reviewers for providing detailed and constructive feedback. It is our great pleasure that AISA 2020 hosted our renowned keynote speakers, Prof. Luciano Baresi from Politecnico di Milano who are well known for his contributions on SOA. Thanks are also due to expert panel members for agreeing to share their expertise at the workshop.

We are especially indebted to Carl K. Chang, Iowa State University (chair of SERVICES2020 steering committee), Hong Mei (SERVICES2020 general chair) and Zhi Jin (program chairs in chief) for their dedication and availability. Without their support, AISA2020 would not have been nearly so special.

We look forward to meeting you at the workshop and hope you enjoy the program of AISA 2020.

The 1st IEEE SERVICES Workshop on Artificial Intelligence and Services Adaption (AISA) Technical Program

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Monday 10/19, 02:40 - 04:20

AISA 1: MicroService QoS and Reliability

Session Chair: Jian Ren, Beihang University

Invited Talk: Luciano Baresi, Politecnico di Milano
My First 15 Years with SOA

AIS_WSS_26

Multi-indicators Prediction in Microservice Using Granger Causality Test and Attention LSTM
Suozhao Ji, Wenjun Wu and Yanjun Pu

AIS_WSS_29

A Heuristic Services Binding Algorithm to Improve Fault-Tolerance in Microservice based Edge Computing
Architecture
Hongjun Dai

Monday 10/19, 06:00 - 07:20

AISA 2: Service Composition and Workflow

Session Chair: Bin Cao, Zhejiang University of Technology

AIS_WSS_28

Workflow Recommendation Based on Graph Embedding
Xiaoming Yu, Wenjun Wu and Xingchuang Liao

AIS_WSS_34

Web Service Recommendation based on Knowledge Graph Convolutional Network and Doc2Vec
Service Availability Guarantee with Adaptive Automatic Flow Control
Jinkun Geng, Buqing Cao, Hongfan Ye, Junjie Chen, Mi Peng and Jianxun Liu

AIS_WSS_10

Service Availability Guarantee with Adaptive Automatic Flow Control
Yudong Li, Yuqing Zhang and Zhangbin Zhou

AIS_WSS_5

Pattern-based Personalized Workflow Fragment Discovery
Jinfeng Wen, Zhangbing Zhou, Wenbo Zhang and Yuqing Zhang

Monday 10/19, 07:40 - 09:40

AISA 3: Microservice Over Cloud

Session Chair: Buqing Cao, Hunan University of Science & Technology

AIS_WSS_7

A Framework to Support Multi-Cloud Collaboration
Lei Hua, Ting Tang, Heng Wu and Wenbo Zhang
Consolidation of Services in Mobile Edge Clouds Using a Learning-based Framework

AIS_WSS_35

Consolidation of Services in Mobile Edge Clouds Using a Learning-based Framework
Saeid Ghafouri, Ali Akbar Saleh-Bigdeli and Joseph Doyle

Panel Discussion

Introduction to The First IEEE Services Workshop on the Software Integrating Collective Service, Intelligence and Ecosystem (COSINE)



Hongbing Wang,
Southeast University
COSINE Co-Chair

In the last few years, the software integrating Collective Service, Intelligence and Ecosystem (COSINE) has been proposed in order to describe a new software development methodology and environment, aiming at providing a variety of services, aided by several Intelligence approaches, for different types of organizations, which mainly address the advancement of quality of software products and services and the improvement of software products development efficiency. COSINE Software has faced a great challenge in the process of development and implementation, due to the diversity and dynamics of services, software systems operation quality assurance, and adaptive evolution of software products. This workshop aims at opening a new insight in this emergent topic for both research and industry.

We received high quality papers from different universities. Each paper was reviewed and selected based on their originality, significance, correctness, relevance, and clarity of presentation.



Jian Cao, Shanghai
Jiaotong University
COSINE Co-Chair

We would like to take this opportunity to thank all the authors for their submissions to this workshop. We also thank the Program Committee members for their efforts in reviewing the papers. Thanks also go to the local conference organizers for their great support.

The First IEEE SERVICES Workshop on the Software Integrating Collective Service, Intelligence and Ecosystem (COSINE): A New Software Development Methodology and Environment

Technical Program

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Thursday 10/22, 01:00 -02:20

COSINE 1: Collective Intelligence based Software Development

Session Chair: Bo Cheng, Beijing University of Posts & Telecommunications

COS_WSS_021

COSINE: A Software Development Model Integrating Collective Intelligence, Service and Ecosystem

Hongbing Wang and Tianjing Hong

COS_WSS_069Blockchain-Empowered Decentralized Framework for Secure and Efficient Software Crowdsourcing

Kang Liu, Wuhui Chen and Zhen Zhang

COS_WSS_074

New Task Oriented Recommendation Method Based on Hungarian Algorithm in Crowdsourcing

Zhimin Shi, Dunwei Gong, Xiangjuan Yao and Mengyi Yang

Thursday 10/22, 02:40 - 04:00

COSINE 2: Knowledge Engineering for Software Development

Session Chair: Haijun Zhang, Harbin Institute of Technology

COS_WSS_072

How to Construct Software Knowledge Graph: A Case Study

Wuqian Lv, Zhifang Liao, Yan Zhang, Li Kuang, Ying Chen and Shuixiu Bi

COS_WSS_075

SoftKG: Building a Software Development Knowledge Graph through Wikipedia Taxonomy

Jihu Wang, Xueliang Shi, Lin Cheng, Kun Zhang and Yuliang Shi

COS_WSS_073

Gamma-Rhythm Oscillations and Synchronization Transition in a Hybrid Excitatory-Inhibitory Complex Network

Yuan Wang, Xia Shi, Bo Cheng and Jun-Liang Chen

Thursday 10/22, 13:00 - 14:20

COSINE 3: Open Source Software Development Process Modeling and Simulation

Session Chair: Changhai Nei, Nanjing University

COS_WSS_071

An Agent Based Simulation System for Open Source Software Development

Boxuan Zhao, Jian Cao, Sha Jiang and Qing Qi

COS_WSS_076

Software Construction Oriented Multi-agent Collaborative Modeling and Simulation

Yan Zhang, Rong Xie, Yangfan He and Bing Li

The Second IEEE SERVICES Workshop on Cyber Security and Resilience in the Internet of Things (CSRIOT) Technical Program

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Monday 10/19, 07:00 - 08:20

CSRIOT 1

Session Chair: Stavros Shiaeles, University of Portsmouth

CSR_WSS_006

A Novel Approach to Detect Phishing Attacks using Binary Visualisation and Machine Learning
Luke Barlow, Gueltoum Bendiab, Stavros Shiaeles and Nick Savage

CSR_WSS_039

A Trust Management System for the IoT Domain
Christos-Minas Mathas, Costas Vassilakis and Nicholas Kolokotronis

CSR_WSS_049

Towards a Novel Conceptualization of Cyber Resilience
Emanuele Bellini and Stefano Marrone

Monday 10/19, 13:00 - 14:20

CSRIOT 2

Session Chair: Nikolaos Kolokotronis, University of Peloponnese

CSR_WSS_047

On the Security and Privacy of Hyperledger Fabric: Challenges and Open Issues
Sotirios Brotsis, Nicholas Kolokotronis, Konstantinos Limniotis, Gueltoum Bendiab and Stavros Shiaeles

CSR_WSS_046

Privacy Issues in Voice Assistant Ecosystems
Georgios Germanos, Dimitris Kavallieros, Nicholas Kolokotronis and Nikolaos Georgiou

The 1st IEEE SERVICES Workshop on Crossover Services (IWCS) and 2nd IEEE SERVICES Workshop on Knowledge Networks Technical Program

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Saturday 10/24, 08:40 - 10:00

WCS1/WKN

Session Chair: Xuesheng Xu, Xidian University

WCS_WSS_3

Root-Cause Analysis and Fine Tuning for Run-time Quality Issues in Transboundary Services
Chao Ma, Weidong Liu, Weifeng Li, Cheng Pan, Zhiying Tu and Zhongjie Wang

WCS_WSS_8

A Collaborative Modeling Approach for Crossover Services
Min Li, Zhiying Tu, Xiaofei Xu, Hanchuan Xu and Zhongjie Wang

WCS_WSS_25

An Approach of Crossover Service Goal Convergence and Conflicts Resolution
Yu Peng, Zhengli Liu, Bing Li and Jian Wang

Saturday 10/24, 13:00 - 14:20

WCS2/WKN

Session Chair: Xuesheng Xu, Xidian University

WKN_WSS_30

Web Service Discovery Based on Knowledge Graph and Similarity Network
Yang Yu, Jun Zeng, Juan Yao, Junhao Wen and Xing Bin

WCS_WSS_38

Value Innovation with Crossover Services
Chen Xi, Liang Zhang, Hongmei Cao and Lin Ye

WCS_WSS_41

Service-Oriented IoT Resources Access and Provisioning Framework
Liqing Zhao, Bo Cheng and Jun-Liang Chen

The 1st IEEE SERVICES Workshop on Data-centric Workflows on Heterogeneous Infrastructures: Challenges and Directions (DAWHI) and 8th IEEE SERVICES Workshop on Software Engineering FOR/IN the Cloud (FORINC)

Technical Program

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Saturday 10/24, 07:00 - 08:20

WHI/FIN 1

Session Chair: Shiyong Lu, Wayne State University and Rami Bahsoon, The University of Birmingham

FIN_WSS_42

Education Model for Developing IoT and Cloud Mobile Applications
Adriana Collaguazo, Mónica Villavicencio and Alain Abran

WHI_WSS_8

Reproducing Scientific Experiment with Cloud DevOps
Feng Zhao, Xingzhi Niu, Shao-Lun Huang and Lin Zhang

WHI_WSS_48

Decentralized workflow management on software defined infrastructures
Yuandou Wang and Zhiming Zhao

The 1st IEEE SERVICES Workshop on Satellite Edge Computing (WoSEC) Technical Program

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Sat 10/24, 02:40 - 04:00

WOSEC 1: Satellite Edge Computing

Session Chair: Houpeng Wang

SEC_WSS_24

A Space-Air-Ground Integrated Network Assisted Maritime Communication Network Based on Mobile Edge Computing

Yue Pang, Danshi Wang, Dongdong Wang, Luyao Guan, Chunyu Zhang and Min Zhang

SEC_WSS_37

A Novel Edge Computing Server Selection Strategy of LEO Constellation Broadband Network

Meilin He, Lei Zhong, Huidong Tan, Ying Qu and Junyu Lai

SEC_WSS_40

A Novel Multi-level Computation Offloading Scheme at LEO Constellation Broadband Network Edge

Tan Huidong, He Meilin, Xia Tian, Zheng Xiaohui and Lai Junyu

SEC_WSS_45

Task Scheduling of High Dynamic Edge Cluster in Satellite Edge Computing

Jiarong Han, Houpeng Wang, Shaojun Wu, Junyong Wei and Lei Yan

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BAIDU

Founded on January 1, 2000, Baidu is the world's largest Chinese language Internet search provider, the largest knowledge and information centered Internet platform company in China, and a world-leading artificial intelligence (AI) platform company. Robin Li, Baidu's co-founder, chairman, and chief executive officer, was awarded a U.S. patent for his development of the Rankdex site-scoring algorithm for search engine page rankings, making China one of only four countries in the world that has developed core search engine technology, along with the United States, Russia, and South Korea.

As the world's largest Chinese language Internet search provider, Baidu responds to billions of search queries from more than 100 countries and regions every day, serving as the most important way for netizens to access Chinese language information. With its mission to “make the complicated world simpler through technology”, Baidu promotes constant technological innovation, and is committed to being a top global technology company which best understands users' needs and enables their growth.



Overview

LIZHI is a leading online UGC audio community and interactive audio entertainment platform in China, with a mission to enable everyone to showcase their vocal talents. The company is aiming to bring people closer together through voices. Since launching LIZHI app in 2013, LIZHI have cultivated a vibrant and growing community encouraging audio content creation and sharing. Now LIZHI is an audio wonderland offering a wide range of podcasts and audio entertainment products and features, including audio live streaming and various interactive audio products, empowering users to enjoy an immersive and diversified entertainment experience through audio. LIZHI envisions a global audio community – a place where everyone can create, share and connect with each other through voices and across cultures.

What Inspires Us

Human voice is powerful. It reveals our feelings and thoughts, creates understanding and empathy, and fills us with joy and inspirations. It establishes companionship and brings us together in a way like no other medium. With the rise of mobile technology, we saw an opportunity to transform audio creation and sharing to elevate the roles of voices in people's lives. That's why we built LIZHI seven years ago - to revamp traditional radio and podcasts to create a bigger and more accessible stage for everyone to create, store, share, discover and enjoy audio, and interact through it. Human voice is unique in expressing one's mood and feelings, and AI technology can help us discern one's voices to understand their feelings and behaviors and further elevate the role of voices in people's lives. We will also endeavor to integrate social responsibilities into our product offerings, through finding people the voices they like, relieving their stress, providing companionship, and bringing them happiness.

What We Do

With user interactions built into every podcast, live streaming and social entertainment product, our users don't just listen on our platform. We launched audio live streaming as our first audio entertainment product in 2016, making it possible for our users to enjoy a multi-dimensional, interactive audio experience. Through LIZHI, users can follow their favorite hosts and channels, become a host and create their own podcasts, perform in live streaming, and interact with others through various interactive features. Today, it is not only easy and fast to discover one's favorite audio on LIZHI - we also offer a far more engaging and diversified entertainment experience through audio.

CCO is the abbreviation of Chief Customer Officer and also the abbreviation of Alibaba Group's Customer Experience Division. In the Alibaba's economy, CCO is the organizational guarantee for the implementation of the "Customer First" value, the neural network of customer experience in the entire economy, and the forefront of reaching consumers and businesses.

New services under the new business must abide by TED principles-T is Talent, E is Empower, and D is Data. In short, companies and organizations must make greater investments in services and customer experience- with the best talent, with the greatest power, and with the best technology.

"Become the cradle of the service ecosystem of new business" and "make experience the core competitiveness of business" is our vision. With our customer service staffs who provide professional services to consumers, businesses and economies, with our experience operational experts who continuously mine the value of existing customers for the platform, and with the data, products and technical talents who provide underlying support for business development, we have become unique in the Internet industry.





The CCO Technology Department is a business unit (BU) under Alibaba Group. It has gradually established higher customer service standards, so that customers can enjoy the most "cool" service in Alibaba, and it has provided one-stop service solutions for Alibaba Group. Through our products, data and technology, we will improve Alibaba Group's ability to serve customers and enhance customer experience across the entire network. Our intelligent and innovative products continue to refresh the record in the service field, changing the working mode from simple human-computer interaction to deep human-computer collaboration. Human-machine collaboration has become the inclusive capability of the entire service industry. We are making service innovation simpler and make the ultimate experience everywhere! We are Looking forward to building a global service experience ecological infrastructure and becoming a leader in the ultimate service experience innovation!



JD iCity

Building Intelligent Cities with AI and Big Data



The core function of AI + Industry Development is to help the government to face the local industry and promote the relevant industries to create new growth momentum. This business is oriented to the whole country, and has achieved good results in Guanghan and Fuqing.



The modernization of urban governance aims to improve the level of government governance and ensure the safety and stability of the city. The construction of Nanjing municipal governance modern command center sets a benchmark for the development of the industry.



Lifestyle service industry is mainly aimed at food, housing, transportation, tourism, entertainment, shopping and other life scenes, and builds an ecological system of digital life, which can be experienced in Beijing Wangfujing Street and Daxing International Airport.



Urban operating system is the digital cornerstone of intelligent city construction, which can realize data security and provide AI component services for intelligent city construction. At present, it has been implemented in Xiong'an new district.



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2021 IEEE WORLD CONGRESS ON SERVICES



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<https://conferences.computer.org/services/2021/>

SEPT 5-10 CHICAGO ILLINOIS USA

*Pending travel and CDC guidelines

CALL FOR PAPERS

The 2021 IEEE World Congress on Services will be held in a hybrid mode with physical presence in Chicago, Illinois, USA. The Congress is solely sponsored by the IEEE Computer Society under the auspice of the Technical Committee on Services Computing (TCSVC). The scope of the Congress will cover all aspects of services computing and applications, current or emerging. Centered around services computing, it covers various systems and networking research pertaining to cloud, edge and Internet-of-Things (IoT), as well as technologies for intelligent computing, learning, Big Data and blockchain applications, addressing critical issues such as knowledge network, high performance, security, privacy, dependability, trustworthiness, and cost-effectiveness. Particularly, 2021 Congress will welcome papers on the impact of COVID-19 on services and corresponding infrastructure. In addition to co-located theme-topic conferences, the Congress will also include symposia and workshops supporting deep-dive discussions on emerging important topics, and complement the Congress program with industry and application presentations and panels. Authors are invited to prepare early and submit original papers to any of these conferences at www.easychair.org. All submitted manuscripts will be peer-reviewed by at least three reviewers. Accepted and presented papers will appear in the conference proceedings published by the IEEE Computer Society Press. The Congress will be organized into the following affiliated conferences:

CLOUD: IEEE International Conference on Cloud Computing

The flagship theme-topic conference for modeling, developing, publishing, monitoring, managing, delivering Everything-as-a-Service (XaaS) in the context of various types of cloud environments.

ICWS: IEEE International Conference on Web Services

The flagship theme-topic conference for Web-based services, featuring services modeling, development, publishing, discovery, recommendation, composition, testing, adaptation, and delivery, and Web services applications and standards.

SCC: IEEE International Conference on Services Computing

The flagship theme-topic conference for services lifecycle, including enterprise and vertical services modeling, microservices-based solutions, services optimization, services marketing, and business process and scientific workflow management.

SMDS: IEEE International Conference on Smart Data Services

The flagship theme-topic conference for data-driven applications and solutions under the as-a-service model, including analytic services, smart data foundation, Big Data services, Blockchain, and data-intensive computing at the edge and in IoT systems.

DHAASS: Symposium on Digital Health as a Service

DHAASS represents an emerging and critical direction for SERVICES toward digital transformation in health and social care, including health/medical microservices and integration, crowd sensing/sourcing, and health service economics.

Congress Organizers

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University of Stuttgart

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Beijing Institute of Technology

Stephen S. Yau

Arizona State University

Important Dates

Early paper submission

March 1, 2021

Notification to early papers

April 15, 2021

Normal paper submission due

May 5, 2021

Final notification to authors

June 17, 2021

Camera-ready paper due

July 1, 2021

Send inquiries to: ieeecs.services@gmail.com
Detailed Information will be posted on the website:
<http://conferences.computer.org/services/2021/>