

The 11th International Conference on Computer Science and its Applications (CSA 2019)  
The 14th KIPS International Conference on Ubiquitous Information Technologies and Applications (CUTE 2019)

**The 11th International Conference on Computer  
Science and its Applications  
(CSA 2019)**  
**&**  
**The 14th KIPS International Conference on  
Ubiquitous Information Technologies and  
Applications  
(CUTE 2019)**

December 18-20, 2019  
Macao China

**Organized by**

**KIPS CSWRG**



## Conferences

### **The 14th International Conference on Multimedia and Ubiquitous Engineering (MUE 2020)**

- April 22-24 2020, Yanbian China
- <http://www.futuretech-conference.org/2020/>

### **The 15th International Conference on Future Information Technology (FutureTech 2020)**

- April 22-24 2020, Yanbian China
- <http://www.futuretech-conference.org/2020/>

## Message from the CSA 2019 General Chair

International Conference on Computer Science and its Applications (CSA 2019) is the 11th event of the series of international scientific conference. This conference takes place Macao, China, Dec. 18 - 20, 2019. CSA 2019 will be the most comprehensive conference focused on the various aspects of advances in computer science and its applications. CSA 2019 will provide an opportunity for academic and industry professionals to discuss the latest issues and progress in the area of CSA. In addition, the conference will publish high quality papers which are closely related to the various theories and practical applications in CSA. Furthermore, we expect that the conference and its publications will be a trigger for further related research and technology improvements in this important subject. CSA 2019 is the next event in a series of highly successful International Conference on Computer Science and its Applications, previously held as CSA 2018 (10th Edition: Kuala Lumpur, Malaysia), CSA 2017 (9th Edition: Taichung, Taiwan), CSA 2016 (8th Edition: Bangkok, Thailand, 2016), CSA 2015 (7th Edition: Cebu, December, 2015), CSA 2014 (6th Edition: Guam, December, 2014), CSA 2013 (5th Edition: Danang, December, 2013), CSA 2012 (4th Edition: Jeju, November, 2012), CSA 2011 (3rd Edition: Jeju, December, 2011), CSA 2009 (2nd Edition: Jeju, December, 2009), and CSA 2008 (1st Edition: Australia, October, 2008).

The papers included in the proceedings cover the following topics: Mobile and ubiquitous computing, Dependable, reliable and autonomic computing, Security and trust management, Multimedia systems and services, Networking and communications, Database and data mining, Game and software engineering, Grid and scalable computing, Embedded system and software, Artificial intelligence, Distributed and parallel algorithms, Web and internet computing and IT policy and business management.

Accepted and presented papers highlight new trends and challenges of Computer Science and its Applications. The presenters showed how new research could lead to novel and innovative applications. We hope you will find these results useful and inspiring for your future research. We would like to express our sincere thanks to Steering Chairs: James J. (Jong Hyuk) Park (SeoulTech, Korea), Yi Pan (Georgia State University, USA), Han-Chieh Chao (National Ilan University, Taiwan), Young-Sik Jeong (Dongguk University, Korea), Vincenzo Loia (University of Salerno, Italy).

Our special thanks go to the Program Chairs: Arun Kumar Sangaiah (VIT University, India), Mu-Yen Chen (National Taichung University of Science and Technology, Taiwan), Houcine Hassan (Universitat Politècnica de València, Spain), and all Program Committee members and all the additional reviewers for their valuable efforts in the review process, which helped us to guarantee the highest quality of the selected papers for the conference.

We cordially thank all the authors for their valuable contributions and the other participants of this conference. The conference would not have been possible without their support. Thanks are also due to the many experts who contributed to making the event a success.

CSA 2019 General Chair

SimonJames Fong, University of Macau, Macau, China  
Kyungeun Cho, Dongguk University-Seoul, Korea  
Kim-Kwang Raymond Choo, The University of Texas at San Antonio, USA  
Victor Leung, The University of British Columbia, Canada  
Jungho Kang, Baewha Women's University, Korea

## Message from the CSA 2019 Program Chairs

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CSA 2019 provides an opportunity for academic and industry professionals to discuss the latest issues and progress in the area of Computer Science. In addition, the conference contains high quality papers which are closely related to the various theories and practical applications in Computer Science. Furthermore, we expect that the conference and its publications will be a trigger for further related research and technology improvements in this important subject. CSA 2019 is the next event in a series of highly successful International Conference on Computer Science and its Applications, previously held as CSA 2018 (10th Edition: Kuala Lumpur, Malaysia), CSA 2017 (9th Edition: Taichung, Taiwan), CSA 2016 (8th Edition: Bangkok, Thailand, 2016), CSA 2015 (7th Edition: Cebu, December, 2015), CSA 2014 (6th Edition: Guam, December, 2014), CSA 2013 (5th Edition: Danang, December, 2013), CSA 2012 (4th Edition: Jeju, November, 2012), CSA 2011 (3rd Edition: Jeju, December, 2011), CSA 2009 (2nd Edition: Jeju, December, 2009), and CSA 2008 (1st Edition: Australia, October, 2008).

CSA 2019 contains high quality research papers submitted by researchers from all over the world. Each submitted paper was peer-reviewed by reviewers who are experts in the subject area of the paper. Based on the review results, the Program Committee accepted papers.

For organizing an International Conference, the support and help of many people is needed. First, we would like to thank all authors for submitting their papers. We also appreciate the support from program committee members and reviewers who carried out the most difficult work of carefully evaluating the submitted papers.

We would like to give my special thanks to Prof. James J. (Jong Hyuk) Park, Prof. Yi Pan, Prof. Han-Chieh Chao, Prof. Young-Sik Jeong, and Prof. Vincenzo Loia the Steering Committee Chairs of CSA for their strong encouragement and guidance to organize the symposium. We would like to thank CSA 2018 General Chairs: Prof. Kim-Kwang Raymond Choo, Prof. Victor Leung, Prof. Jung-ho Kang. We would like to express special thanks to committee members for their timely unlimited support.

CSA 2019 Program Chairs

Arun Kumar Sangaiah, VIT University, India  
Mu-Yen Chen, National Taichung University of Science and Technology, Taiwan  
Houcine Hassan, Universitat Politècnica de València, Spain

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Yutaka Watanobe, University of Aizu, Japan

## Message from the CUTE 2019 General Chairs

On behalf of the organizing committees, it is our pleasure to welcome you to the 14th International Conference on Ubiquitous Information Technologies and Applications (CUTE 2019), will be held in Macao, China on December 18-20, 2019.

This conference provides an international forum for the presentation and showcase of recent advances on various aspects of ubiquitous computing. It will reflect the state-of-the-art of the computational methods, involving theory, algorithm, numerical simulation, error and uncertainty analysis and/or novel application of new processing techniques in engineering, science, and other disciplines related to ubiquitous computing.

The papers included in the proceedings cover the following topics: Ubiquitous Communication and Networking, Ubiquitous Software Technology, Ubiquitous Systems and Applications, Ubiquitous Security, Privacy and Trust. Accepted papers highlight new trends and challenges in the field of ubiquitous computing technologies. We hope you will find these results useful and inspiring for your future research.

We would like to express our sincere thanks to Steering Committees: James J. Park (SeoulTech, Korea), Doo-Soon Park (SoonChunHyang University, Korea), Young-Sik Jeong (Dongguk University, Korea), Hsiao-Hsi Wang (Providence University, Taiwan), Laurence T. Yang (St.Francis Xavier University, Canada), Hai Jin (Huangzhong University of Science and Technology, China), Chan-Hyun Youn (KAIST, Korea), Jianhua Ma (Hosei University, Japan), Mingyi Guo (Shanghai Jiao Tong University, China), Weijia Jia (City University of Hong Kong, Hong Kong). We would also like to express our cordial thanks to the Program Chairs & Program Committee members for their valuable efforts in the review process, which helped us to guarantee the highest quality of the selected papers for the conference.

Finally, we would thank all the authors for their valuable contributions and the other participants of this conference. The conference would not have been possible without their support. Thanks are also due to the many experts who contributed to making the event a success.

CUTE 2019 General Chairs

Simon James Fong, University of Macau, Macau, China

Yi Pan, Georgia State University, USA

Luis Javier Garcia Villalba, Universidad Complutense de Madrid, Spain

## Message from the CUTE 2019 Program Chairs

Welcome to the 14th International Conference on Ubiquitous Information Technologies and Applications (CUTE 2019), will be held in Macao, China on December 18-20, 2019.

The purpose of the CUTE 2019 conference is to promote discussion and interaction among academics, researchers and professionals in the field of ubiquitous computing technologies. This year the value, breadth, and depth of the CUTE 2019 conference continues to strengthen and grow in importance for both the academic and industrial communities. This strength is evidenced this year by having the highest number of submissions made to the conference.

For CUTE 2019, we received a lot of paper submissions from various countries. Out of these, after a rigorous peer review process, we accepted only high-quality papers for CUTE 2019 proceeding, published by the Springer. All submitted papers have undergone blind reviews by at least two reviewers from the technical program committee, which consists of leading researchers around the globe. Without their hard work, achieving such a high-quality proceeding would not have been possible. We take this opportunity to thank them for their great support and cooperation.

Finally, we would like to thank all of you for your participation in our conference, and also thank all the authors, reviewers, and organizing committee members. Thank you and enjoy the conference!

CUTE 2019 Program Chairs

Muhammad Khurram Khan, King Saud University, Kingdom of Saudi Arabia  
Neil Y. Yen, University of Aizu, Japan  
Yunsick Sung, Dongguk University, Korea



## Organization

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Wanquan Liu, Curtin University, Australia  
Wookey Lee, Inha University, Korea

## Invited Speaker



### Cyber-Physical-Social Systems: Design Automation and Data Analytics

**Prof. Laurence T. Yang**

Department of Computer Science  
St Francis Xavier University, Canada

#### **Abstract:**

The booming growth and rapid development in embedded systems, wireless communications, sensing techniques and emerging support for cloud computing and social networks have enabled researchers and practitioners to create a wide variety of Cyber-Physical-Social Systems (CPSS) that reason intelligently, act autonomously, and respond to the users' needs in a context and situation-aware manner. The CPSS are the integration of computation, communication and control with the physical world, human knowledge and sociocultural elements. It is a novel emerging computing paradigm and has attracted wide concerns from both industry and academia in recent years.

Currently, CPSS are still in their infancy stage. Our first ongoing research is to study effective and efficient approaches for CPSS modeling and general system design automation methods, as well as methods analyzing and/or improving their power and energy, security, trust and reliability features.

Once the CPSS have been designed, they collect massive data (Volume) from the physical world by various physical perception devices (Variety) in structured/semi-structured/unstructured format and respond the users' requirements immediately (Velocity) and provide the proactive services (Veracity) for them in physical space or social space. These collected big data are normally high dimensional, redundant and noisy, and many beyond the processing capacity of the computer systems. Our second ongoing research is focused on the Data-as-a-Service framework, which includes data representation, dimensionality reduction, incremental and distributed processing (securely on cloud), deep learning, clustering, prediction and proactive services, aiming at representing and processing big data generated from CPSS, providing more valued smart services for human and refining the previously designed CPSS.

This talk will present our latest research on these two directions. Corresponding case studies in some applications such as smart home and traffics will be shown to demonstrate the feasibility and flexibility of the proposed system design methodology and analytic framework.

#### **Biography:**

Laurence T. Yang got his BE in Computer Science and Technology and BSc in Applied Physics both from Tsinghua University, China and Ph.D in Computer Science from University of Victoria, Canada.

He is a professor and W.F. James Research Chair at St. Francis Xavier University, Canada. His research includes parallel and distributed computing, embedded and ubiquitous/pervasive computing, and big data. He has published around 400 international journal papers in the above areas, of which half on top IEEE/ACM Transactions and Journals, others mainly on Elsevier, Springer and Wiley Journals. In recent several years, 4 and 23 papers have been listed as top 0.1% and top 1% highly-cited ESI papers, respectively.

He has been involved actively act as a steering chair for 6+ IEEE international conferences. He served as the vice-chair of IEEE CS Technical Committee of Supercomputing Applications (2001-2004), the chair of IEEE CS Technical Committee of Scalable Computing (2008-2011). He was the vice-chair (2014) and the chair (2015) of IEEE Canada Atlantic Section. Now he is the chair of IEEE CS Technical Committee of Scalable Computing (2018-), the co-chair of IEEE SMC Technical Committee on Cybermatics (2016-) and the vice-chair of IEEE CIS Technical Committee on Smart World (2016-2018).

In addition, he was the editors-in-chief of several international journals. Now he is serving as an editor for many international journals (such as IEEE Systems Journal, IEEE Access, Future Generation of Computer Systems (Elsevier), Information Sciences (Elsevier), Information Fusion (Elsevier), Big Data Research (Elsevier), etc). He has been acting as an author/co-author or an editor/co-editor of more than 25 books from well-known publishers. He has been invited to give around 40 keynote talks at various international conferences and symposia.

His recent honours and awards include Fellow of Engineering Institute of Canada (2019), AMiner Most Influential Scholar Award for Internet of Things (2018), IEEE TCCPS Distinguished Leadership Award on Cyber-Physical Systems (2018), IEEE SCSTC Life-Career Achievement Award on Smart Computing (2018), Fellow of Canadian Academy of Engineering (2017), IEEE System Journal Best Paper Award (2017), IEEE TCSC Award for Excellence in Scalable Computing (2017), and the PROSE Award on Engineering and Technology (2010).

## PROGRAM SCHEDULE FOR CSA & CUTE 2019

Day 1, December 18, 2019				
Time	Min	HALL A	HALL B	HALL C
<b>08: 40-09: 00</b>	20	<b>Registration</b>		
<b>09: 00-10: 30</b>	90	<b>Session A-1</b> CSA Chair:	<b>Session B-1</b> CSA Chair:	<b>Session C-1</b> CUTE Chair:
<b>10: 30-10: 40</b>	10	<b>Coffee Break</b>		
<b>10: 40-12: 10</b>	90	<b>Session A-2</b> CSA Chair:	<b>Session B-2</b> CUTE Chair:	<b>Session C-2</b> CUTE Chair:
<b>12: 10-13: 30</b>	80	<b>Lunch</b>		
<b>13: 30-14: 20</b>	50	<b>Keynote Speech: Laurence T. Yang</b> “Cyber-Physical-Social Systems: Design Automation and Data Analytics”		
<b>14: 20-14: 30</b>	10	<b>Coffee Break</b>		
<b>14: 30-16: 00</b>	90	<b>Session A-3</b> CSA Chair:	<b>Session B-3</b> CUTE Chair:	<b>Session C-3</b> CUTE Chair:
<b>16: 00-16: 10</b>	10	<b>Coffee Break</b>		
<b>16: 10-17: 30</b>	90	<b>Session A-4</b> CSA Chair:	<b>Session B-4</b> SXRT 2019 Chair:	<b>Session C-4</b> CUTE Chair:
<b>17: 30-18: 00</b>	30	<b>Break</b>		
<b>18: 00-19: 30</b>	90	<b>Banquet</b>		

Day 2, December 19, 2019			
Time	Min	HALL A	HALL B
08: 40-09: 00	20	Registration	
09: 00-10: 30	90	<b>Session A-5</b> <b>HRH 2019</b> Chair:	<b>Session B-5</b> <b>IPV 2019</b> Chair:
10: 30-10: 40	10	Coffee Break	
10: 40-12: 10	90	<b>Session A-6</b> <b>CSA/CUTE</b> Chair:	<b>Session B-6</b> <b>IPV 2019</b> Chair:

Day 3, December 20, 2019		
Time	Min	HALL A
10: 00-12: 00	120	CSA - Organizing Committee Meeting
13: 00-15: 00	120	CUTE - Organizing Committee Meeting
15: 00-17: 00	120	Local Arrangement Committee Meeting

1. A paper presentation should be made by one of authors of the paper for 15 minutes (10 minutes for the presentation itself and 5 minutes for Q/A).
2. All speakers of each session should meet the session chair at their room 10 minutes before the session begins.
3. Windows 7 laptops running the Adobe Reader and Microsoft Office for paper presentations will be prepared. Please prepare for your presentation.

## Conference Venue

### University of Macau, China

- Address: University of Macau Avenida da Universidade, Taipa, Macau, China
- Phone: +853 8822 8833, +853 8822 8822

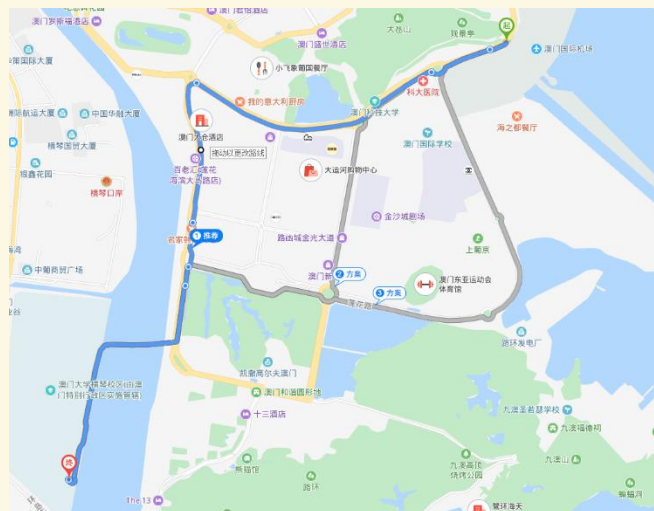




## How to get to University of Macau ?

### I. By car

From Airport International De Macau, you can drive the car entering the Av. WaiLong road and drive 150 meters. Turning left, entering airfield circle, drive 510 meters. Entering roundabout, next, entering Av. WaiLong road, drive 2.4km. Turn left, enter Av. Marginal Flor de Lotus, drive 1.1 kilometers. Entering the roundabout and then entering the Rotunal Marginal, drive 350 meters. Enter roundabout and then entering Av. Marginal Flor de Lotus main road, drive 150 meters. Driving along the front right, from Av. Marginal Flor de Lotus main road to Hengqin campus of the university of Macau, drive 2.2 km.





## II. By Bus

A. From Airport International De Macau, you can take the bus MT1 to the bus station called as Estrada da Baia de Nossa Senhora da Esperanca bus station. And then Transfer to No.72 bus to the University of Macau bus station. (RIGHT)

B. From Airport International De Macau, you can take the bus 51A to the bus station called as CidadeNova bus station. And then Transfer to No.72 bus to the Macau university bus station. (LEFT)

