

Lecture Notes on Data Engineering and Communications Technologies

Volume 12

Series editor

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The aim of the book series is to present cutting edge engineering approaches to data technologies and communications. It publishes latest advances on the engineering task of building and deploying distributed, scalable and reliable data infrastructures and communication systems.

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Leonard Barolli · Fatos Xhafa
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Editors

Advances on Broad-Band Wireless Computing, Communication and Applications

Proceedings of the 12th International
Conference on Broad-Band Wireless
Computing, Communication and Applications
(BWCCA-2017)

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Welcome Message of BWCCA-2017 International Conference Organizers

Welcome to the 12th IEEE International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2017), which will be held in conjunction with the 12th 3PGCIC-2017 International Conference from November 8 to November 10, 2017 in Barcelona, Spain.

This International Conference is a forum for sharing ideas and research work in the emerging areas of broadband and wireless computing. Information networking is going through a rapid evolution. Different kinds of networks with different characteristics are emerging, and they are integrating in heterogeneous networks. For these reasons, there are many interconnection problems which may occur at different levels of the hardware and software design of communicating entities and communication networks. These kinds of networks need to manage an increasing usage demand, provide support for a significant number of services, guarantee their QoS, and optimize the network resources.

The success of all-IP networking and wireless technology has changed the ways of living the people around the world. The progress of electronic integration and wireless communications is going to pave the way to offer people the access to the wireless networks on the fly, based on which all electronic devices will be able to exchange the information with each other in ubiquitous way whenever necessary.

The aim of this conference is to present the innovative research and technologies as well as developments related to broadband networking, and mobile and wireless communications. This edition BWCCA-2017 received 184 paper submissions and based on review results, we accepted 48 papers (about 26% acceptance ratio) for presentation in the conference and publication in the Springer Lecture Notes on Data Engineering and Communication Technologies Proceedings.

The organization of an International Conference requires the support and help of many people. A lot of people have helped and worked hard to produce a successful BWCCA-2017 technical program and conference proceedings. First, we would like to thank all authors for submitting their papers, Program Committee Members, and reviewers who carried out the most difficult work by carefully evaluating the submitted papers.

This year in conjunction with BWCCA-2017 we have five International Workshops that complemented BWCCA-2017 program with contributions for specific topics. We would like to thank the Workshop Co-chairs and all workshop organizers for organizing these workshops.

We thank Shinji Sakamoto, Donald Elmazi, Yi Liu, and Miralda Cuka, Fukuoka Institute of Technology (FIT), Japan, as Web Administrator Co-Chairs and Dr. Makoto Ikeda, FIT, Japan, as Finance Chair for their excellent work.

We would like to express our gratitude to Prof. Makoto Takizawa, Hosei University, Japan, and Marta Aymerich, Open University of Catalonia, Spain, as Honorary Co-Chairs of BWCCA-2017 for their support and help.

We give special thanks to Prof. Isaac Woungang, Ryerson University, Canada, Dr. Zahoor Ali Khan, Higher Colleges of Technology, United Arab Emirates, and Prof. Deborah Richards, Macquarie University, Australia, for kindly accepting to be Keynote Speakers of BWCCA-2017. Finally, we would like to thank the Local Arrangement Team for making excellent local arrangement for the conference.

We hope you will enjoy the conference and have a great time in Barcelona, Spain.

Santi Caballe
Leonard Barolli
BWCCA-2017 General Co-chairs
Jordi Conesa
Tomoya Enokido
Lidia Ogiela
BWCCA-2017 Program Committee Co-chairs

Welcome Message from BWCCA-2017 Workshop Co-chairs

Welcome to the workshops of the 12th IEEE International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2017), which will be held in conjunction with the 12th 3PGCIC-2017 International Conference from November 8 to November 10, 2017 in Barcelona, Spain.

This year five workshops will be held in conjunction with BWCCA-2017 International Conference. The workshops are very important part of the main conference, and they cover specific topics related to next-generation networks, network traffic analysis, sensor technologies, smart environments, complex systems, wireless communication, mobile networks, and multimedia networking.

BWCCA-2017 workshops are listed in following:

1. The 19th International Symposium on Multimedia Network Systems and Applications (MNSA-2017)
2. The 10th International Workshop on Next Generation of Wireless and Mobile Networks (NGWMN-2017)
3. The 8th International Workshop on Methods, Analysis and Protocols for Wireless Communication (MAPWC-2017)
4. The 8th International Workshop on Cloud, Wireless and e-Commerce Security (CWECS-2017)
5. The 6th International Workshop on Robot Interaction, Control, Communication and Cooperation (RI3C-2017)

These workshops bring to the researchers conducting research in specific themes the opportunity to learn from this rich multi-disciplinary experience.

The Workshop Chairs would like to thank the workshop organizers for their great efforts and hard work in proposing the workshop, selecting the papers, the interesting programs and for the arrangements of the workshop during the conference days.

We hope you enjoy the workshop programs and proceedings.

Xavier Vilajosana
Elis Kulla
Xiaofeng Chen
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Welcome Message from MNSA-2017 International Symposium Co-chairs

It is our great pleasure to welcome you to the 19th International Symposium on Multimedia Network Systems and Applications (MNSA-2017), which will be held in conjunction with the 12th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2017) in Barcelona, Spain, from November 8 to November 10, 2017.

This international symposium is a forum for sharing ideas and research work in the emerging areas of multimedia networking and systems.

Networks of today are going through a rapid evolution and the growing popularity of wired and wireless networks, multimedia network systems and applications are changing our daily life. In the last few years, we have observed an explosive growth of multimedia computing, communication, and applications. This revolution is transforming the way people lives, works, and interacts with each other and is impacting the way business, education, entertainment, and health care are operating. Presently, a lot of research on high-speed networks and multimedia communication is going on. The papers included in this symposium cover aspects of IoT, multimedia applications, DTNs, network protocols, distributed computing systems, and wireless networks.

Many people contributed to the success of MNSA-2017. First, we would like to thank the organizing committee of BWCCA-2017 International Conference for giving us the opportunity to organize the symposium. We would like to thank all authors for submitting their research work and for their participation. We are looking forward to meet them again in the forthcoming editions of the workshop.

We would like to express our appreciation to MNSA-2017 reviewers who carefully evaluated the submitted papers. Finally, we would like to thank the Local Arrangement Chairs for the local arrangement of the workshop.

We hope you will enjoy the symposium and have a great time in Barcelona, Spain.

Makoto Takizawa
Leonard Barolli
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MNSA-2017 Program Co-chair

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Technology, Japan
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Oxford Brookes University, UK
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Welcome Message from NGWMN-2017 International Workshop Co-chairs

Welcome to the 10th International Workshop on Next Generation of Wireless and Mobile Networks (NGWMN-2017), which will be held in conjunction with the 12th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2017) in Barcelona, Spain, from November 8 to November 10, 2017.

The aim of this workshop is to present the innovative researches, methods, and algorithms for wireless networks, sensor networks, and ubiquitous computing. The next generation of wireless and mobile networks is expected to allow a single mobile user to access heterogeneous wireless and mobile networks. Therefore, this workshop will provide a timely technical forum for the dissemination of new results in this exciting research area and is devoted to the architectures, protocols, resource management, mobility management, and scheduling in integrated wireless and mobile networks.

Many people have kindly helped us to prepare and organize the NGWMN-2017 workshop. First, we would like to thank the authors who submitted high-quality papers and reviewers who carefully evaluated the submitted papers. We would like to give our special thanks to General Co-Chairs of BWCCA-2017 for their strong encouragement and guidance to organize this workshop. We would like to thank all of the PC Members for their serious review works in order to make successful organization of NGWMN-2017.

Finally, we would like to thank the Local Organizing Committee of BWCCA-2017 for excellent arrangement.

We hope you will enjoy the conference and have a great time in Barcelona, Spain.

Leonard Barolli
Hsing-Chung Chen (Jack Chen)
Kangbin Yim
NGWMN-2017 Co-chairs

NGWMN-2017 Organizing Committee

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Message from MAPWC-2017 International Workshop Organizers

Welcome to the 8th International Workshop on Methods, Analysis and Protocols for Wireless Communication (MAPWC-2017), which will be held in conjunction with the 12th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2017) in Barcelona, Spain, from November 8 to November 10, 2017.

Wireless communications are characterized by high bit-error rates and burst errors, which arise due to interference fading, shadowing, terminal mobility, and so on. Since the traditional design of the algorithms, methods, and protocols of the wired Internet did not take wireless networks into account, the performance over wireless networks is largely degraded. Especially, the multi-hop communication aggravates the problem of wireless communication even further. To solve these problems, there has been increased interest to propose and design new algorithms and methodologies for wireless communication.

The aim of this workshop is to present the innovative researches, methods, and numerical analysis for wireless communications and wireless networks. The workshop contains high-quality research papers, which were selected carefully by Program Committee Members.

It is impossible to organize such a successful program without the help of many individuals. We would like to express our appreciation to the authors of the submitted papers, and to the Program Committee Members, who provided timely and significant review.

We hope all of you will enjoy MAPWC-2017 and find this a productive opportunity to exchange ideas with many researchers.

Leonard Barolli
MAPWC-2017 Workshop Chair
Makoto Ikeda
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Message from CWECS-2017 International Workshop Organizers

Welcome to Barcelona, Spain and the 8th International Workshop on Cloud, Wireless and e-Commerce Security (CWECS-2017), which is held in conjunction with the 12th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2017) in Barcelona, Spain, from November 8 to November 10, 2017.

Computer network and communication have been a part of our everyday life. People use them to contact others almost anytime anywhere. However, hackers due to business benefits, enjoying their skill/professional achievement or some other reasons very often attack, intrude or penetrate our systems. This is the key reason why computer/network security has been one of the important issues in computer research. Many researchers have tried to do their best to develop system security techniques and the methods to protect a system. But system attacks still occur worldwide every day. In fact, current system security technology is far away from perfect and should be continuously improved.

This workshop aims to present the innovative researches, methods and applications for cloud, wireless and e-commerce security. Other network related papers are also welcomed. The workshop contains high-quality research papers, which were selected carefully by Program Committee Members.

It is impossible to organize such a successful program without the help of many individuals. We would like to express our appreciation to the authors of the submitted papers, and to the Program Committee Members, who provided timely and significant reviews.

We hope all of you will enjoy CWECS-2017 and find this a productive opportunity to exchange ideas with many researchers.

Fang-Yie Leu
Aniello Castiglione
Chu-Hsing Lin
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Message from RI3C-2017 International Workshop Organizers

Welcome to the 6th International Workshop on Robot Interaction, Control, Communication and Cooperation (RI3C-2017), which will be held in conjunction with the 12th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2017) in Barcelona, Spain, from November 8 to November 10, 2017.

Robots are being steadily introduced into modern everyday life and are expected to play a key role in the near future. Typically, the robots are deployed in situations where it is too dangerous, expensive, tedious, and complex for humans to operate. Although many of the real-life applications may only need a single robot, a large number of them require the cooperation, coordination, and communication of a team of robots to accomplish a certain task. The use of multiple robots of overlapping capabilities offers a cost-effective and more robust solution. This redundancy in the robots' capabilities makes the overall system more flexible and fault-tolerant.

This workshop focuses on the emerging field of robot interaction, communication, and cooperation bringing together research and application of methodology from robotics, human factors, human-computer interaction, interaction design, cognitive psychology, education, and other fields to enable robots to have more natural and more rewarding interactions, communication, and cooperation with humans throughout their spheres of functioning.

The design of an efficient collaborative multi-robot framework that ensures the autonomy and the individual requirements of the involved robots is a very challenging task. Developing operational multi-robot teams involves research on a number of topics such as fault-tolerant cooperative control, adaptive action selection, distributed control, robot awareness of team member actions, improving efficiency through learning, inter-robot communication, action recognition, local versus global control, and metrics for measuring the success.

The aim of this workshop is to present the innovative researches, technologies and new concepts, services, and application software of robotic systems.

The organization of an International Workshop needs the help of many people. We would like to express our appreciation to the authors of the submitted papers, and to the Program Committee Members.

We hope all of you will enjoy RI3C-2017 program and your stay in Barcelona, Spain.

Leonard Barolli
RI3C-2017 Workshop Chair
Keita Matsuo
Hiroyuki Fujioka
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BWCCA-2017 Keynote Talks

InterCloud and HetNet for Mobile Cloud Computing in 5G Systems: Design Issues, Challenges, and Optimization

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Abstract. Emerging 5G systems will be featured by a closer collaboration between mobile network operators and cloud service providers to meet the communication and computational requirements of modern mobile applications and services in a mobile cloud computing (MCC) environment. In this talk, we will show how the marriage between heterogeneous wireless networks (HetNets) and multiple clouds (referred to as InterCloud) stands out as an effective response for the mobile data deluge. First, we review the building blocks of a HetNet and an InterCloud as well as the resource management entities in both domains. Second, we will discuss on how they can be orchestrated to better support the task offloading process. Third, we will identify the key design criteria and challenges related to interoperation between an InterCloud and a HetNet. Finally, we will introduce a novel revenue sharing approach for a coalition between a mobile network operator and cloud service providers and show that using the Shapley concept, this approach can achieve the maximum revenue for the coalition by optimally associating the users to the clouds through the base stations.

Advancements in Internet of Things (IoT): Design Challenges and Importance of Fog Computing Over Cloud Computing

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Abu Dhabi, United Arab Emirates

Abstract. Advancements in the field of Internet are increasing at a remarkable rate. Currently only 1% things are connected via Internet. Internet of Things (IoT) is a new revolution which will interconnect approximately 50 billion computing and non-computing devices (things) by 2020. Advances in IoT bring new challenges of managing this real-time sensor data. In this talk, we will focus on these challenges with their possible solutions. The importance of Fog computing over Cloud computing in IoT will also be analyzed with the demonstration of real-life scenarios.

Intelligent Virtual Agents for Education and Training

Deborah Richards

Macquarie University, Sydney, Australia

Abstract. This talk will provide an overview of the types and uses of intelligent virtual agents. Intelligent virtual agents (IVAs) have been a growing area of research within the field of Artificial Intelligence in the past 20 years. An IVA is a piece of software, generally considered to be autonomous in some way, that imitates the behavior of a human or animal and is embodied within a virtual environment. A primary aim in the field of virtual agents is the creation of believable characters that are useful in their situated paradigm (e.g., games, narratives, education, assistive computing, etc.). There is a significant body of work in the area of believable characters which may be known as pedagogical agents, embodied conversational agents, artificial companions, talking heads, empathic or listening agents depending on their function, level of sophistication or the particular research focus such as emotion and appraisal systems or language technology. The talk will provide an overview of the field, including my research concerning IVAs and memory, emotions, and collaborative learning for applications such as debriefing and reminiscing, border security officer training, scientific inquiry and science education, real estate assistance, museum guidance, and adherence to treatment advice.

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