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Innovative Mobile and Internet Services in Ubiquitous Computing

Proceedings of the 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017)

Springer

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Welcome Message of IMIS-2017 International Conference Organizers

Welcome to the 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017), which will be held from July 10 to July 12, 2017, at Istituto Superiore Mario Boella (ISMB), Torino, Italy, in conjunction with the 11th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2017).

This International Conference focuses on the challenges and solutions for Ubiquitous and Pervasive Computing (UPC) with an emphasis on innovative, mobile and Internet services. With the proliferation of wireless technologies and electronic devices, there is a fast-growing interest in UPC. UPC enables to create a human-oriented computing environment, where computer chips are embedded in everyday objects and interact with physical world. Through UPC, people can get online even while moving around, thus having almost permanent access to their preferred services. With a great potential to revolutionize our lives, UPC also poses new research challenges. The conference provides an opportunity for academic and industry professionals to discuss the latest issues and progress in the area of UPC.

For IMIS-2017, we received many paper submissions from all over the world. The papers included in the proceedings cover important aspects from UPC research domain. This year, we received 141 submissions and after a careful review process of three independent reviews per submission, 38 papers were accepted (about 27% acceptance rate).

It is impossible to organize such a successful program without the help of many individuals. We would like to express our great appreciation to the authors of the submitted papers, the program committee members, who provided timely and significant reviews, and special session chairs for their great efforts. We are grateful to Honorary Co-chairs: Prof. Makoto Takizawa, Hosei University, Japan, and Mr. Massimo Marcarini, Istituto Superiore Mario Boella, Italy, for their advice and support.

This year in conjunction with IMIS-2017, we have eight International Workshops that complemented IMIS-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, and Yi Liu, Fukuoka Institute of Technology, Japan, for their excellent work and support as Web Administrators.

Finally, we would like to thank the members of the Local Arrangement Team of ISMB for their support and good local arrangement for the conference.

We hope that all of you enjoy IMIS-2017 and find this a productive opportunity to learn, exchange ideas, and make new contacts.

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Welcome Message from IMIS-2017 Workshops Co-chairs

Welcome to the Workshops of the 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017), which will be held from July 10 to July 12, 2017, at Istituto Superiore Mario Boella (ISMB), Torino, Italy.

This year, we have eight workshops, which will be held together with IMIS-2017. The objective was to complement as much as possible the main themes of IMIS-2017 with the specific topics of the different workshops to cover many topics of Ubiquitous and Pervasive Computing (UPC).

The list of workshops is as follows:

1. The 11th International Workshop on Advances in Information Security (**WAIS-2017**)
2. The 7th International Workshop on Mobile Commerce, Cloud Computing, Network and Communication Security (**MCNCS-2017**)
3. The 7th International Workshop on Intelligent Techniques and Algorithms for Ubiquitous Computing (**ITAUC-2017**)
4. The 7th International Workshop on Future Internet and Next Generation Networks (**FINGNet-2017**)
5. The 6th International Workshop on Frontiers in Innovative Mobile and Internet Services (**FIMIS-2017**)
6. The 6th International Workshop on Sustainability Management of e-Business and Ubiquitous Commerce Engineering (**SMEUCE-2017**)
7. The 6th International Workshop on Extending Seamlessly to the Internet of Things (**esIoT-2017**)
8. The 3rd International Workshop on Big Data and IoT Security (**BDITS-2017**)

We would like to thank IMIS-2017 International Conference Organizers for their help and support. We are grateful to the workshop organizers for their great efforts and hard work in proposing the workshops, selecting the papers, organizing interesting programs, and for the arrangements of the workshops during the conference days.

We are grateful to Shinji Sakamoto, Donald Elamzi, and Yi Liu, Fukuoka Institute of Technology, Japan, for their excellent work and support as Web Administrators. We would also like to give special thanks to the Local Organization Team of ISMB, Torino, Italy.

We hope you enjoy the workshops programs and proceedings.

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Welcome Message from WAIS-2017 International Workshop Organizers

It is our great pleasure to welcome you for the 11th International Workshop on Advances in Information Security (WAIS-2017). The workshop will be held in conjunction with 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017), from July 10 to July 12, 2017, at Istituto Superiore Mario Boella (ISMB), Torino, Italy.

As computing systems have begun to pervade every aspect of daily life, people need to be able to trust them—so much of their lives depend on them. Today, many of these systems are far too vulnerable to cyber-attacks that can inhibit their operation, corrupt valuable data, or expose private information. Future systems will include sensors and computers everywhere, exacerbating the attainment of security and privacy. Current security practices largely address current and known threats, but there is a need for research to take account future threats too.

The goal of WAIS-2017 is to bring together computer scientists, industrial engineers, and researchers to discuss and exchange experimental or theoretical results, novel designs, work in progress, experience, case studies, and trend-setting ideas in the area of Information Security.

We would like to thank all authors for submitting their research works to the workshop and the PC members for checking carefully the papers.

We look forward to meet all of you in Torino, Italy.

WAIS-2017 Workshop Co-chairs

Leonard Barolli	Fukuoka Institute of Technology (FIT), Japan
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Welcome Message from MCNCS-2017 International Workshop Chair

Welcome to the 7th International Workshop on Mobile Commerce, Cloud Computing, Network and Communication and their Securities (MCNCS-2017), which will be in conjunction with the 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017) at Istituto Superiore Mario Boella (ISMB), Torino, Italy.

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

This workshop aims to present the innovative researches, methods for mobile commerce, cloud computing, network and communication and their securities. The workshop contains high-quality research papers, which were selected carefully by program committee members. We selected six papers which will be presented in a session.

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 MCNCS-2017 and find this a productive opportunity to exchange ideas with many researchers.

MCNCS-2017 International Workshop Organizers

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Aniello Castiglione	University of Salerno, Italy
Chu-Hsing Lin	Tunghai University, Taiwan

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Jung-Chun Liu	Tunghai University, Taiwan
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Welcome Message from ITAUC-2017 International Workshop Co-chairs

Welcome to the 7th International Workshop on Intelligent Techniques and Algorithms for Ubiquitous Computing (ITAUC-2017), which will be held in conjunction with the 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017) at Istituto Superiore Mario Boella (ISMB), Torino, Italy, from July 10 to July 12, 2017.

The aim of this workshop is to present the innovative researches, methods, and algorithms for wireless networks, sensor networks and ubiquitous computing. It is intended to facilitate exchange of ideas and collaborations among researchers from computer science, network computing, mathematics, statistics, intelligent computing, and such related sciences, to discuss various aspects of innovative intelligent algorithms and networks security, intelligent techniques for sensor networks and radio networks, and their applications.

Many people have kindly helped us to prepare and organize the ITAUC-2017 workshop. First, we highly thank the authors who submitted high-quality papers and reviewers who carefully evaluated these submissions. We thank Honorary Co-chair, General Co-chairs, PC Co-chairs, and Workshops Co-chairs of IMIS-2017 for their advice and support to make possible organization of ITAUC-2017.

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

We hope you will enjoy the conference and have a great time in Torino, Italy.

ITAUC-2017 Co-chairs

Leonard Barolli	Fukuoka Institute of Technology, Japan
Hsing-Chung Chen	Asia University, Taiwan
Yung-Fa Huang	Chaoyang University of Technology, Taiwan

ITAUC-2017 Organizing Committee

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Hsing-Chung Chen	Asia University, Taiwan
Yung-Fa Huang	Chaoyang University of Technology, Taiwan

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Yeong-Chin Chen	Asia University, Taiwan
Timothy K. Shih	National Central University, Taiwan
Hsi-Chin Hsin	National United University, Taiwan
Ming-Shiang Huang	Asia University, Taiwan
Chia-Cheng Liu	Asia University, Taiwan
Chia-Hsin Cheng	National Formosa University Yunlin County, Taiwan
Tzu-Liang Kung	Asia University, Taiwan
Gene Shen	Asia University, Taiwan
Jim-Min Lin	Feng Chia University, Taiwan
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Shu-Hong Lee	Chienkuo Technology University, Taiwan
Ho-Lung Hung	Chienkuo Technology University, Taiwan
Gwo-Ruey Lee	Lung-Yuan Research Park, Taiwan
Li-Shan Ma	Chienkuo Technology University, Taiwan
Chung-Wen Hung	National Yunlin University of Science & Technology University, Taiwan
Yung-Chen Chou	Asia University, Taiwan
Chen-Hung Chuang	Asia University, Taiwan
Jing-Doo Wang	Asia University, Taiwan
Jui-Chi Chen	Asia University, Taiwan
Young-Long Chen	National Taichung University of Science and Technology, Taiwan

Web Administrator

Shinji Sakamoto	Fukuoka Institute of Technology, Japan

Welcome Message from FINGNet-2017 International Workshop Organizers

Welcome to the 7th International Workshop on Future Internet and Next Generation Networks (FINGNet-2017), which will be held in conjunction with the 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017), from July 10 to July 12, 2017, at Istituto Superiore Mario Boella (ISMB), Torino, Italy.

Over the last years, new paradigms and concepts have emerged in telecommunication networks that are currently being realized in the Internet. Among those are the social networking, the peer-to-peer, and the quality of experience paradigms. Nevertheless, it is difficult or even impossible to predict how the network of the future will emerge. However, it is quite clear that some major issues have to be addressed for the future Internet or next-generation networks. This includes solutions, e.g., for security and privacy issues, such as spam or service-oriented approaches to enable flexible networking. In addition, new applications or services emerge such as social media networks or crowdsourcing platforms enabling collaborative networking of Internet users. To address these issues, there is an increased interest in the scientific community to propose and design new algorithms and methodologies as well as to understand and model new applications and services.

The aim of this workshop is to present such innovative research, methods, and numerical analysis related to advanced Internet and network technologies. The workshop contains high-quality research papers, which were carefully selected by the technical program committee members. We selected four papers which will be presented in this workshop.

It is impossible to organize such a successful program without the help of many authors, program committee members, and organizers. Special thanks to the members and the organizing committee members from Istituto Superiore Mario Boella (ISMB) in Torino, Italy. We also would like to deeply 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 FINGNet-2017 and find this a productive opportunity to exchange ideas with many researchers. Finally, we would like to

thank everyone for participating in FINGNet-2017 workshop. We hope that you will find the workshop along with other joint workshops and conferences stimulating.

FINGNet-2017 Workshop Co-chairs

Tobias Hossfeld	University of Wuerzburg, Germany
Inshil Do	Ewha Womans University, Korea
Hae-Duck Joshua Jeong	Korean Bible University, Korea

FINGNet-2017 Workshop Advisory Co-chairs

Kijoon Chae	Ewha Womans University, Korea
Akihiro Nakao	University of Tokyo, Japan
Jiyoung Lim	Korean Bible University, Korea

FINGNet-2017 Organizing Committee

Workshop Co-chairs

Tobias Hossfeld	University of Wuerzburg, Germany
Inshil Do	Ewha Womans University, Korea
Hae-Duck Joshua Jeong	Korean Bible University, Korea

Advisory Co-chairs

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Akihiro Nakao	University of Tokyo, Japan
Jiyoung Lim	Korean Bible University, Korea

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Xiangjiu Che	Jilin University, China
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Putchong Uthayopas	Kasetsart University, Thailand
Xiaohui Wei	Jilin University, China
Lawrence WC Wong	National University of Singapore, Singapore
Kun-Ming Yu	Chung Hua University, Taiwan

Welcome Message from FIMIS-2017 International Workshop Chair

It is our great pleasure to welcome you the 6th International Workshop on Frontiers in Innovative Mobile and Internet Services (FIMIS-2017), which will be held in conjunction with the 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017), from July 10 to July 12, 2017, at Istituto Superiore Mario Boella (ISMB), Torino, Italy.

The workshop focuses on challenges and solutions for Ubiquitous and Pervasive Computing (UPC) with an emphasis on innovative, mobile and Internet services. In particular, the main goal of FIMIS-2017 is to bring together researchers, practitioners, and decision-makers to demonstrate the state of the art as well as future directions for UPC.

The organization of a workshop needs the help of many people. We would like to express our special thanks to the authors and reviewers whose contribution makes this workshop a reality.

Hopefully, you will enjoy the workshop and have a great time in Torino, Italy.

FIMIS-2017 Workshop Chair

Leonard Barolli — Fukuoka Institute of Technology, Japan

FIMIS-2017 Organizing Committee

Workshop Co-chairs

Leonard Barolli — Fukuoka Institute of Technology, Japan

Program Committee Members

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Kangbin Yim	Soonchunhyang University, Korea

Web Administrator

Shinji Sakamoto	Fukuoka Institute of Technology, Japan

Welcome Message from SMEUCE-2017 International Workshop Co-chairs

We welcome you to the 6th International Workshop on Sustainability Management of e-Business and Ubiquitous Commerce Engineering (SMEUCE-2017), which will be held in conjunction with the 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017) at Fukuoka Institute of Technology (FIT), Japan, from July 10 to July 12, 2017.

The aim of SMEUCE-2017 is to provide a platform for academics, business leaders, consultants, and other professionals from all over the world to exchange the latest research findings in the field of Sustainability Management of e-Business, e-Business & u-Business (Ubiquitous Business) Engineering, Cloud Commerce, and their relative applications. This conference provides opportunities for the delegates to exchange new ideas and application experiences face-to-face, to establish business or research relations, and to find global partners for future collaboration.

Many people have kindly helped us to prepare and organize the SMEUCE-2017 workshop. First, we highly thank the authors who submitted high-quality papers and reviewers who carefully evaluated these submissions. We are thankful to Prof. Makoto Takizawa, Hosei University, Japan, as Honorary Chair of IMIS-2017. We would like to give our special thanks to Prof. Leonard Barolli and Prof. Fatos Xhafa as General Co-chairs of IMIS-2017 for their strong encouragement and guidance to organize this workshop. We would like to thank the PC Co-chairs and Workshops Co-chairs for their advice and support to make possible organization of SMEUCE-2017.

Finally, we would like to thank the Local Organizing Committee of Fukuoka Institute of Technology (FIT), Japan, for excellent arrangement.

We hope you will enjoy the conference and have a great time in Fukuoka, Japan.

SMEUCE-2017 Co-chairs

Ying-Li Lin	Asia University, Taiwan
Kuei-Yuan Wang	Asia University, Taiwan
Mei-Hua Liao	Asia University, Taiwan
Hsing-Chung Chen	Asia University, Taiwan

SMEUCE-2017 Organizing Committee

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Kuei-Yuan Wang	Asia University, Taiwan
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Mei Hua Huang	Asia University, Taiwan
Young-Long Chen	National Taichung University of Science and Technology, Taiwan

Web Administrator Chair

Shinji Sakamoto	Fukuoka Institute of Technology, Japan

Welcome Message from esIoT-2017 International Organizers

Welcome to the 6th Edition of the International Workshop on Extending Seamlessly to the Internet of Things (esIoT-2017), which will be held in conjunction with the 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017), from July 10 to July 12, 2017, at Istituto Superiore Mario Boella (ISMB), Torino, Italy.

The workshop is intended to facilitate exchange of ideas and collaborations between researchers from on the one hand telecommunications, computer science, mathematics, and intelligent computing and on the other hand such related sciences, to discuss various aspects of Web of Things, IP connectivity for smart things, cloud computing, Internet of Things, cyber-physical Systems, participative sensing/computing, and crowdsensing.

Many people have kindly helped us to prepare and organize the esIoT-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 Prof. Leonard Barolli for his support to make this workshop very successful and for his strong encouragement and guidance to organize the workshop.

We hope you will enjoy the workshop and have a great time in Torino, Italy

esIoT-2017 Organizers

Antonio J. Jara	University of Applied Science Western Switzerland (HES-SO), Switzerland
Antonio F. Skarmeta	University of Murcia, Spain

esIoT-2017 Organizing Committee

Workshop Organizers

Antonio J. Jara	University of Applied Science Western Switzerland (HES-SO), Switzerland
Antonio F. Skarmeta	University of Murcia, Spain

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Welcome Message from BDITS-2017 International Workshop Co-chairs

Welcome to the 3rd International Workshop on Big Data and IoT Security (BDITS-2017), which will be held in conjunction with the 11th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2017), from July 10 to July 12, 2017, at Istituto Superiore Mario Boella (ISMB), Torino, Italy.

The aim of BDITS-2017 is to provide a platform for academics, the leaders of network security, consultants, and other professionals from all over the world to exchange the latest research findings in the field of Security Technologies of Big Data and Internet of Things (IoT), cloud and ubiquitous computing, and their applications. This workshop provides opportunities for the delegates to exchange new ideas and application experiences face-to-face, to establish research relations, and to find global partners for future collaboration.

Many people have kindly helped us to prepare and organize the BDITS-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 Prof. Leonard Barolli for his strong encouragement and guidance to organize this workshop. We would like to thank PC Co-chairs and Workshops Co-chairs of IMIS-2017 for their kindly support.

We would like to thank all PC members for their serious review works in order to make successful organization of BDITS-2017. Finally, we would like to thank the Local Organizing Committee of IMIS-2017 for excellent arrangement.

We hope you will enjoy the conference and have a great time in Torino, Italy.

BDITS-2017 Co-chairs

Baojiang Cui	Beijing University of Posts and Telecommunications, China
Zheli Liu	Nankai University, China
Tainhan Gao	National Pilot Software College, China
Hsing-Chung Chen	Asia University, Taiwan

BDITS-2017 Organizing Committee

Workshop Co-chairs

Baojiang Cui	Beijing University of Posts And Telecommunications, China
Zheli Liu	Nankai University, China
Tainhan Gao	National Pilot Software College, China
Hsing-Chung Chen	Asia University, Taiwan

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Neng-Yih Shih	Asia University, Taiwan
Timothy K. Shih	National Central University, Taiwan
Yung-Fa Huang	Chaoyang University of Technology, Taiwan
Chia-Hsin Cheng	National Formosa University Yunlin County, Taiwan
Tzu-Liang Kung	Asia University, Taiwan
Shu-Hong Lee	Chienkuo Technology University, Taiwan
Ho-Lung Hung	Chienkuo Technology University, Taiwan
Gwo-Ruey Lee	Lung-Yuan Research Park, Taiwan
Li-Shan Ma	Chienkuo Technology University, Taiwan
Chung-Wen Hung	National Yunlin University of Science & Technology University, Taiwan
Jui-Chi Chen	Asia University, Taiwan

Web Administrator Chair

Shinji Sakamoto	Fukuoka Institute of Technology, Japan

IMIS-2017 Keynotes Talks

Raspberries on the Edge

Sven Helmer

Free University of Bozen-Bolzano, Bozen-Bolzano, Italy

Abstract. With the advent of the Internet of Things (IoT), billions of new devices will join the data networks, many of them generating data streams originating from sensors or other sources. Instead of pushing all this data to centralized (cloud) servers, it makes a lot of sense to preprocess, analyze, and aggregate it on site. This is the central idea of edge computing, reducing storage requirements for central servers, lowering the network load, and also decreasing reaction times for time-critical applications. Deploying the necessary infrastructure for edge computing is already a challenge in well-developed, urbanized settings; it is even harder to do so in harsh environments located in rural and remote areas. Platforms based on small single-board computers, such as Raspberry Pis, could ameliorate this situation by providing a solution with low costs and power consumption. In this keynote, we look at some of the challenges faced by edge computing in general and also explore particular low-resource scenarios.

The Future of IT Technologies

Patrick Demichel

Hewlett Packard, Les Ulis, France

Abstract. Our society and industry are facing a large number of MegaTrends. The IIoT "Intelligent Internet of Things" and Machine Learning are some of the most promising. At the same time, we observe many signs that we are reaching some fundamental limits of our old technologies and infrastructures. Our laboratories demonstrated a decade ago that we have no choice but to implement a radical and holistic transformation, if we expect to reach the Exascale frontier at a reasonable power envelope. We anticipated also a set of news problems, like edge computing and its requirements in terms of security. This large research program called "The Machine" is now entering its final development phase with a group of partners grouped in a consortium named "gen-Z." We will explore what are the fundamental bricks enabling this historical evolution of our architectures. We will also consider some implications on how we could solve our most challenging problems in a short future, with a huge potentiality for the IIoT, Exascale, and ML ecosystems.

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