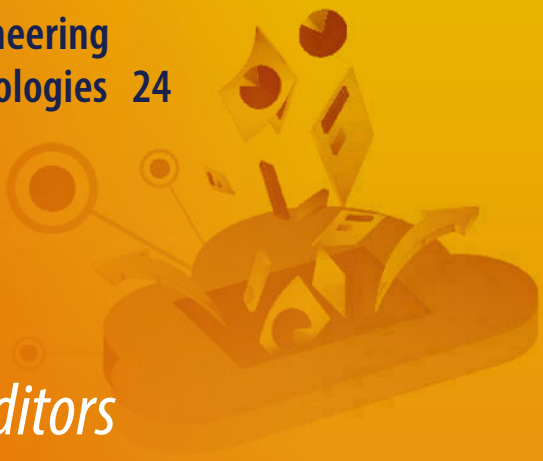
Lecture Notes on Data Engineering and Communications Technologies 24



Fatos Xhafa
Fang-Yie Leu
Massimo Ficco
Chao-Tung Yang *Editors*

Advances on P2P, Parallel, Grid, Cloud and Internet Computing

Proceedings of the 13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2018)

Springer

Lecture Notes on Data Engineering and Communications Technologies

Volume 24

Series editor

Fatos Xhafa, Technical University of Catalonia, Barcelona, Spain
e-mail: fatos@cs.upc.edu

The aim of the book series is to present cutting edge engineering approaches to data technologies and communications. It will publish latest advances on the engineering task of building and deploying distributed, scalable and reliable data infrastructures and communication systems.
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Fatos Xhafa · Fang-Yie Leu
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Editors

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Springer

Editors
Fatos Xhafa
Dept De Ciències De La Computació
Universitat Politècnica De Catalunya
Barcelona, Spain

Fang-Yie Leu
Tunghai University
Taichung, Taiwan

Massimo Ficco
Università Della Campania Luigi Vanvitelli
Caserta, Italy

Chao-Tung Yang
Tunghai University
Taichung, Taiwan

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Welcome Message from the 3PGCIC-2018 Organizing Committee

Welcome to the 13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2018), which will be held in conjunction with BWCCA-2018 International Conference, October 27–29, 2018, Tunghai University, Taichung, Taiwan.

P2P, grid, cloud and Internet computing technologies have been established as breakthrough paradigms for solving complex problems by enabling large-scale aggregation and sharing of computational data and other geographically distributed computational resources.

Grid computing originated as a paradigm for high-performance computing, as an alternative to expensive supercomputers. Since the late 1980's, grid computing domain has been extended to embrace different forms of computing, including semantic and service-oriented grid, pervasive grid, data grid, enterprise grid, autonomic grid, knowledge and economy grid.

P2P computing appeared as the new paradigm after client–server and Web-based computing. These systems are evolving beyond file sharing towards a platform for large-scale distributed applications. P2P systems have as well inspired the emergence and development of social networking, business to business (B2B), business to consumer (B2C), business to government (B2G), business to employee (B2E) and so on.

Cloud computing has been defined as a "computing paradigm where the boundaries of computing are determined by economic rationale rather than technical limits". Cloud computing is a multi-purpose paradigm that enables efficient management of data centres, timesharing and virtualization of resources with a special emphasis on business model. Cloud computing has fast become the computing paradigm with applications in all application domains and providing utility computing at large scale.

Finally, Internet computing is the basis of any large-scale distributed computing paradigms; it has very fast developed into a vast area of flourishing field with enormous impact on today's information societies. Internet-based computing serves thus as a universal platform comprising a large variety of computing forms.

The aim of the 3PGCIC conference is to provide a research forum for presenting innovative research results, methods and development techniques from both theoretical and practical perspectives related to P2P, grid, cloud and Internet computing.

Many people have helped and worked hard to produce a successful 3PGCIC-2018 technical programme and conference proceedings. First, we would like to thank all the authors for submitting their papers, the PC members and the reviewers who carried out the most difficult work by carefully evaluating the submitted papers. Based on the reviewers' reports, the Programme Committee selected 24 papers for the main conference and 22 workshop papers for publication in the Springer Lecture Notes on Data Engineering and Communication Technologies Proceedings. The General Chairs of the conference would like to thank the PC Co-Chairs, Chao-Tung Yang, Tunghai University, Taiwan; Massimo Ficco, Campania University L. Vanvitelli, Italy; and Marcello Luiz Brocardo, Santa Catarina State University, Brazil. We would like to appreciate the work of the workshop Co-Chairs, Der-Jiunn Deng, National Changhua University of Education, Taiwan; Rubem Pereira, Liverpool John Moores University, UK; and Juggapong Natwichai, Chiang Mai University, Thailand, for supporting the workshop organizers. Our appreciations also go to all workshop organizers for their hard work in successfully organizing these workshops.

We are grateful to Honorary Co-Chairs, Prof. Makoto Takizawa, Hosei University, Japan; Mao-Jiun Wang, Tunghai University, Taiwan; and Jyh-Cheng Chen, National Chiao Tung University, Taiwan, for their support and encouragement.

Our special thanks to Prof. Han-Chieh Chao, National Dong Hwa University, Taiwan; Dr. Nadeem Javaid, COMSATS Institute of IT, Islamabad, Pakistan; and Dr. Jyh-Cheng Chen, Chair Professor, Department of Computer Science, National Chiao Tung University, Hsinchu, Taiwan, for delivering inspiring keynotes at the conference.

Finally, we would like to thank the Local Organizing Committee of Tunghai University, Taiwan, for making excellent local arrangement for the conference.

We hope you will enjoy the conference and have a great time in Taichung, Taiwan!

Li-Chih Wang
Fang-Yie Leu
Leonard Barolli
3PGCIC-2018 General Co-chairs

Message from the 3PGCIC-2018 Workshops Chairs

Welcome to the workshops of the 13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2018), held during 27–29 October, 2018, Tunghai University, Taichung, Taiwan. The objective of the workshops was to present research results, work on progress and thus complement the main themes of 3PGCIC-2018 with specific topics of grid, P2P, cloud and Internet computing.

The workshops cover research on simulation and modelling of emergent computational systems, multimedia, Web, streaming media delivery, middleware of large-scale distributed systems, network convergence, pervasive computing and distributed systems and security.

The held workshops are as follows:

- 11th International Workshop on Simulation and Modelling of Emergent Computational Systems (SMECS-2018)
- 9th International Workshop on Streaming Media Delivery and Management Systems (SMDMS-2018)
- 8th International Workshop on Multimedia, Web and Virtual Reality Technologies and Applications (MWVRTA-2018)
- 5th International Workshop on Distributed Embedded Systems (DEM-2018)
- International Workshop on Business Intelligence and Distributed Systems (BIDS-2018)

We would like to thank all workshop organizers for their hard work in organizing these workshops and selecting high-quality papers for presentation at workshops, the interesting programmes and for the arrangements of the workshop during the conference days.

We hope you will enjoy the conference and have a great time in Taichung, Taiwan!

Der-Jiunn Deng
Rubem Pereira
Juggapong Natwichai
3PGCIC-2018 Workshops Chairs

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Welcome Message from the 11th SMECS-2018 Workshop Organizers

On the behalf of the organizing committee of 11th International Workshop on Simulation and Modelling of Engineering & Computational Systems, we would like to warmly welcome you for this workshop, which is held in conjunction with the 13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2018) from 27–29 October, 2018, Tunghai University, Taichung, Taiwan.

Modelling and simulation have become the de facto approach for studying the behaviour of complex engineering, enterprise information and communication systems before deployment in a real setting. The workshop is devoted to the advances in modelling and simulation techniques in the fields of emergent computational systems in complex biological and engineering systems and real-life applications.

Modelling and simulation are greatly benefiting from the fast development of information technologies. The use of mathematical techniques in the development of computational analysis together with the ever greater computational processing power is making possible the simulation of very large complex dynamic systems. This workshop seeks relevant contributions to the modelling and simulation driven by computational technology.

The papers were reviewed and give a new insight into the latest innovations in the different modelling and simulation techniques for emergent computational systems in computing, networking, engineering systems and real-life applications. Contributions comprise modelling and techniques for big data, cloud and fog computing and data privacy.

We hope that you will find the workshop an interesting forum for discussion, research cooperation, contacts and valuable resource of new ideas for your research and academic activities.

Leonard Barolli
Workshop Organizer

Welcome Message from the 9th SMDMS-2018 Workshop Organizers

It is my great pleasure to welcome you to the 2018 International Workshop on Streaming Media Delivery and Management Systems (SMDMS-2018). We hold this 9th edition of the workshop in conjunction with the 13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2018) from 27–29 October, 2018, Tunghai University, Taichung, Taiwan.

The tremendous advances in communication and computing technologies have created large academic and industrial fields for streaming media. Streaming media have an interesting feature that the data stream continuously. They include many types of data like sensor data, video/audio data, stock data. It is obvious that with the accelerating trends towards streaming media, information and communication techniques will play an important role in the future network. In order to accelerate this trend, further progresses of the researches on streaming media delivery and management systems are necessary. The aim of this workshop is to bring together practitioners and researchers from both academia and industry in order to have a forum for discussion and technical presentations on the current researches and future research directions related to this hot research area.

I would like to express my gratitude to the authors of the submitted papers for their excellent papers. I am very thankful to the programme committee members who devoted their time for preparing and supporting the workshop. Without their help, this workshop would never be successful. A list of all of them is given in the programme as well as the workshop website. I would like to also thank 3PGCIC-2018 organizing committee members for their tremendous support for organizing.

Finally, I wish to thank all SMDMS-2018 attendees for supporting this workshop. I hope that you have a memorable experience you will never forget.

Tomoki Yoshihisa
SMDMS-2018 International Workshop Chair

Welcome Message from the 8th MWVRTA-2018 Workshop Organizers

Welcome to the 8th International Workshop on Multimedia, Web and Virtual Reality Technologies and Applications (MWVRTA 2018), which will be held in conjunction with the 13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2018) from 27–29 October, 2018, Tunghai University, Taichung, Taiwan.

With the appearance of multimedia, Web and virtual reality technologies, different types of networks, paradigms and platforms of distributed computation are emerging as new forms of the computation in the new millennium. Among these paradigms and technologies, Web computing, multimodal communication and tele-immersion software are most important. From the scientific perspective, one of the main targets behind these technologies and paradigms is to enable the solution of very complex problems such as e-science problems that arise in different branches of science, engineering and industry. The aim of this workshop is to present innovative research and technologies as well as methods and techniques related to new concept, service and application software in emergent computational systems, multimedia, Web and virtual reality. It provides a forum for sharing ideas and research work in all areas of multimedia technologies and applications.

We would like to express our appreciation to the authors of the submitted papers and to the programme committee members, who provided timely and significant review.

We hope that all of you will enjoy MWVRTA 2018 and find this a productive opportunity to exchange ideas and research work with many researchers.

Leonard Barolli
Yoshitaka Shibata
MWVRTA 2018 Workshop Co-chairs
Kaoru Sugita
MWVRTA 2018 Workshop PC Chair

Welcome Message from the 5th DEM-2018 Workshop Organizers

Welcome to the 5th International Workshop on Distributed Embedded systems (DEM-2018), which is held in conjunction with the 13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2018) from 27–29 October, 2018, Tunghai University, Taichung, Taiwan.

The tremendous advances in communication technologies and embedded systems have created an entirely new research field in both academia and industry for distributed embedded software development. This field introduces constrained systems into distributed software development. The implementation of limitations like real-time requirements, power limitations, memory constraints within a distributed environment requires the introduction of new software development processes, software development techniques and software architectures. It is obvious that these new methodologies will play a key role in future networked embedded systems. In order to facilitate these processes, further progress of the research and engineering on distributed embedded systems is mandatory.

The international workshop on distributed embedded systems (DEM) aims to bring together practitioners and researchers from both academia and industry in order to have a forum for discussion and technical presentations on the current research and future research directions related to this hot scientific area. Topics include (but are not limited to) virtualization on embedded systems, model-based embedded software development, real time in the cloud, Internet of things, distributed safety concepts, embedded software for (mechatronics, automotive, health care, energy, telecom, etc.), sensor fusion, embedded multi-core software, distributed localization, distributed embedded software development and testing. This workshop provides an international forum for researchers and participants to share and exchange their experiences, discuss challenges and present original ideas in all aspects of distributed and/or embedded systems.

I would like to appreciate the organizing committee of the 3PGCIC-2018 International Conference for giving us the opportunity to organize the workshop. My sincere thanks to programme committee members and to all the authors of the workshop for submitting their research works and for their participation.

I hope you will enjoy DEM workshop and have a great time in Taichung, Taiwan.

Peter Hellinckx
DEM 2018 Workshop Chair

Welcome Message from the BIDS-2018 Workshop Organizers

Welcome to the 2018 International Workshop on Business Intelligence and Distributed Systems (BIDS-2018), which is held in conjunction with the 13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2018) from 27–29 October, 2018, Tunghai University, Taichung, Taiwan.

As many large-scale enterprise information systems start to utilize P2P networks, parallel, grid, cloud and Internet computing, they have become a major source of business information. Techniques and methodologies to extract quality information in distributed systems are of paramount importance for many applications and users in the business community. Data mining and knowledge discovery play key roles in many of today's prominent business intelligence applications to uncover relevant information of competitors, consumers, markets and products, so that appropriate marketing and product development strategies can be devised. In addition, formal methods and architectural infrastructures for related issues in distributed systems, such as e-commerce and computer security, are being explored and investigated by many researchers.

The international BIDS workshop aims to bring together scientists, engineers and practitioners to discuss, exchange ideas and present their research findings on business intelligence applications, techniques and methodologies in distributed systems. We are pleased to have four high-quality papers selected for presentation at the workshop and publication in the proceedings.

We would like to express our sincere gratitude to the members of the Programme Committee for their efforts and the 13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing for co-hosting BIDS-2018. Most importantly, we thank all the authors for their submission and contribution to the workshop.

Kin Fun Li
Shengrui Wang
BIDS-2018 International Workshop Co-chairs

3PGCIC-2018 Keynote Talks

Deep Learning Platform for B5G Mobile Network

Han-Chieh Chao

National Dong Hwa University, Taiwan

Abstract. The 3G and 4G mobile communications had been developed for many years. The 5G mobile communication is scheduled to be launched in 2020. In the future, a wireless network is of various sizes of cells and different types of communication technologies, forming a special architecture of heterogeneous networks (HetNet). Under the complex network architecture, interference and handover problems are critical challenges in the access network. How to efficiently manage small cells and to choose an adequate access mechanism for the better quality of service is a vital research issue. Traditional network architecture can no longer support existing network requirements. It is necessary to develop a novel network architecture. Therefore, this keynote speech will share a solution of deep learning-based B5G mobile network which can enhance and improve communication performance through combining some specific technologies, e.g. deep learning, fog computing, cloud computing, cloud radio access network (C-RAN) and fog radio access network (F-RAN).

Intelligent Context Awareness in Internet of Agricultural Things

Nadeem Javaid

COMSATS Institute of IT, Islamabad, Pakistan

Abstract. Variability in climate and recession in water reservoirs are diminishing the agrarian sector ecosystem production day by day. There is an imperative requirement to restore the robustness and ensure high production rate with the use of smart communication infrastructure. Moreover, the farmers will be able to make resource-efficient decisions with the availability of modern monitoring systems like Internet of agricultural things (IoAT). However, the data generated through IoAT devices are disparate which need to be handled intelligently to bring artificial intelligence (AI), machine learning (ML) and data analytic (DA) techniques into play. This speech will discuss how to intensively use the coordination between AI, ML and DA at middleware to optimize the performance of IoAT system along with context awareness. Additionally, horizontal functionality of the diverse services to mitigate the problem of inter-operability will also be the part. An analysis using TOWS matrix to consider the effects of internal and external factors on the performance of automation techniques collaboration will be discussed. The analysis points out various opportunities to innovate the livelihood of agrarian society around the globe.

Softwarization and Virtualization of 5G Core Networks

Jyh-Cheng Chen

Department of Computer Science, National Chiao Tung University, Hsinchu, Taiwan

Abstract. It is envisioned in the future that not only smartphones will connect to cellular networks, but also all kinds of different wearable devices, sensors, vehicles, etc. However, since the characteristics of different devices differ largely, people argue that future 5G communication systems should be designed to elastically accommodate these different scenarios. The evolution of core networks will be driven by integrating heterogeneous networking technologies with the ultimate goal of migrating towards a new form of softwarized and programmable network. In this talk, I will first present the evolution of cellular systems from first generation (1G) to fourth generation (4G), with a focus on core networks. I will then discuss the softwarization and virtualization of 5G core networks.

Contents

13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2018)

iDBP: A Distributed Min-Cut Density-Balanced Algorithm for Incremental Web-Pages Ranking 3
Sumalee Sangamuang, Pruet Boonma, and Juggapong Natwichai

Fault-Tolerant Fog Computing Models in the IoT 14
Ryuji Oma, Shigenari Nakamura, Dilawaer Duolikun, Tomoya Enokido, and Makoto Takizawa

Semi-synchronocity Enabling Protocol and Pulsed Injection Protocol For A Distributed Ledger System 26
Bruno Andriamanalimanana, Chen-Fu Chiang, Jorge Novillo, Sam Sengupta, and Ali Tekeoglu

WebSocket-Based Real-Time Single-Page Application Development Framework 36
Hao Qu and Kun Ma

Texture Estimation System of Snacks Using Neural Network Considering Sound and Load 48
Shigeru Kato, Naoki Wada, Ryuji Ito, Takaya Shiozaki, Yudai Nishiyama, and Tomomichi Kagawa

Blockchain-Based Trust Communities for Decentralized M2M Application Services 62
Besfort Shala, Ulrich Trick, Armin Lehmann, Bogdan Ghita, and Stavros Shiaeles

Parameterized Pulsed Transaction Injection Computation Model And Performance Optimizer For IOTA-Tango 74
Bruno Andriamanalimanana, Chen-Fu Chiang, Jorge Novillo, Sam Sengupta, and Ali Tekeoglu

A Real-Time Fog Computing Approach for Healthcare Environment 85
Eliza Gomes, M. A. R. Dantas, and Patricia Plentz

On Construction of a Caffe Deep Learning Framework based on Intel Xeon Phi 96
Chao-Tung Yang, Jung-Chun Liu, Yu-Wei Chan, Endah Kristiani, and Chan-Fu Kuo

A Brief History of Self-destructing Data: From 2005 to 2017 107
Xiao Fu, Zhijian Wang, Yong Chen, Yunfeng Chen, and Hao Wu

The Implementation of a Hadoop Ecosystem Portal with Virtualization Deployment 116
Chao-Tung Yang, Chien-Heng Wu, Wen-Yi Chang, Whey-Fone Tsai, Yu-Wei Chan, Endah Kristiani, and Yuan-Ping Chiang

A Model for Data Enrichment over IoT Streams at Edges of Internet 128
Reinout Van Hille, Fatos Xhafa, and Peter Hellinckx

SQL Injection in Cloud: An Actual Case Study 137
Xiao Fu, Zhijian Wang, Yong Chen, Yunfeng Chen, and Hao Wu

Smart Intrusion Detection with Expert Systems 148
Flora Amato, Francesco Moscato, Fatos Xhafa, and Emilio Vivenzio

Cognitive Codes for Authentication and Management in Cloud Computing Infrastructures 160
Marek R. Ogiela and Lidia Ogiela

Threshold Based Load Balancer for Efficient Resource Utilization of Smart Grid Using Cloud Computing 167
Mubariz Rehman, Nadeem Javaid, Muhammad Junaid Ali, Talha Saif, Muhammad Hassaan Ashraf, and Sadam Hussain Abbasi

A Fuzzy-based Approach for MobilePeerDroid System Considering of Peer Communication Cost 180
Yi Liu, Kosuke Ozera, Keita Matsuo, Makoto Ikeda, and Leonard Barolli

On the Security of a CCA-Secure Timed-Release Conditional Proxy Broadcast Re-encryption Scheme 192
Xu An Wang, Arun Kumar Sangaiah, Nadia Nedjah, Chun Shan, and Zuliang Wang

Cloud-Fog Based Load Balancing Using Shortest Remaining Time First Optimization 199
Muhammad Zakria, Nadeem Javaid, Muhammad Ismail, Muhammad Zubair, Muhammad Asad Zaheer, and Faizan Saeed

Mining and Utilizing Network Protocol's Stealth Attack Behaviors 212
YanJing Hu, Xu An Wang, HaiNing Luo, and Shuaishuai Zhu

A Fuzzy-Based System for Selection of IoT Devices in Opportunistic Networks Considering Number of Past Encounters 223
Miralda Cuka, Donald Elmazi, Kevin Bylykbashi, Keita Matsuo, Makoto Ikeda, and Leonard Barolli

Hill Climbing Load Balancing Algorithm on Fog Computing 238
Maheen Zahid, Nadeem Javaid, Kainat Ansar, Kanza Hassan, Muhammad KaleemUllah Khan, and Mohammad Waqas

Performance Analysis of WMN-PSOSA Simulation System for WMNs Considering Weibull and Chi-Square Client Distributions 252
Shinji Sakamoto, Leonard Barolli, and Shusuke Okamoto

Automated Risk Analysis for IoT Systems 265
Massimiliano Rak, Valentina Casola, Alessandra De Benedictis, and Umberto Villano

Workshop SMECS-2018: 11th International Workshop on Simulation and Modelling of Engineering and Computational Systems

Integration of Cloud-Fog Based Platform for Load Balancing Using Hybrid Genetic Algorithm Using Bin Packing Technique 279
Muhammad Zubair, Nadeem Javaid, Muhammad Ismail, Muhammad Zakria, Muhammad Asad Zaheer, and Faizan Saeed

More Secure Outsource Protocol for Matrix Multiplication in Cloud Computing 293
Xu An Wang, Shuaishuai Zhu, Arun Kumar Sangaiah, Shuai Xue, and Yunfei Cao

Load Balancing on Cloud Using Professional Service Scheduler Optimization 300
Muhammad Asad Zaheer, Nadeem Javaid, Muhammad Zakria, Muhammad Zubair, Muhammad Ismail, and Abdul Rehman

Privacy Preservation for Re-publication Data by Using Probabilistic Graph 313
Pachara Tinamas, Nattapon Harnsamut, Surapon Riyana, and Juggapong Natwichai

Workshop SMDMS-2018: 9th International Workshop on Streaming Media Delivery and Management Systems

Evaluation of Scheduling Method for Division Based Broadcasting of Multiple Video Considering Data Size 329
Ren Manabe and Yusuke Gotoh

A Design of Hierarchical ECA Rules for Distributed Multi-viewpoint Internet Live Broadcasting Systems 340
Satoru Matsumoto, Tomoki Yoshihisa, Tomoya Kawakami, and Yuuichi Teranishi

An Evaluation on Virtual Bandwidth for Video Streaming Delivery in Hybrid Broadcasting Environments 348
Tomoki Yoshihisa

A Load Distribution Method for Sensor Data Stream Collection Considering Phase Differences 357
Tomoya Kawakami, Tomoki Yoshihisa, and Yuuichi Teranishi

Workshop MWVRTA-2018: The 8th International Workshop on Multimedia, Web and Virtual Reality Technologies

Proposal of a Zoo Navigation AR Application Using Markerless Image Processing 371
Hayato Sakamoto and Tomoyuki Ishida

Implementation of a Virtual Reality Streaming Software for Network Performance Evaluation 381
Ko Takayama, Yusi Machidori, and Kaoru Sugita

Remote Voltage Controls by Image Recognitions for Adaptive Array Antenna of Vehicular Delay Tolerant Networks 387
Noriki Uchida, Ryo Hashimoto, Goshi Sato, and Yoshitaka Shibata

A Collaborative Safety Flight Control System for Multiple Drones: Dealing with Weak Wind by Changing Drones Formation 395
Noriyasu Yamamoto and Noriki Uchida

Workshop DEM-2018: 5th International Workshop on Distributed Embedded Systems

Contact Detection for Social Networking of Small Animals 405
Rafael Berkvens, Ivan Herrera Olivares, Siegfried Mercelis, Lucinda Kirkpatrick, and Maarten Weyn

Introduction of Deep Neural Network in Hybrid WCET Analysis 415
Thomas Huybrechts, Amber Cassimon, Siegfried Mercelis, and Peter Hellinckx

Distributed Uniform Streaming Framework: Towards an Elastic Fog Computing Platform for Event Stream Processing 426
Simon Vanneste, Jens de Hoog, Thomas Huybrechts, Stig Bosmans, Muddsair Sharif, Siegfried Mercelis, and Peter Hellinckx