
Editorial

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Biographical notes: Zhen Yang received his PhD from Shanghai Jiao Tong University in 1999. He made further study in Bremen University in the Federal Republic of Germany from 1992 to 1993, and University of Maryland in the USA in 2003. Now, he is a Professor and President at Nanjing University of Posts and Telecommunications, Nanjing, China. His main research interests focus on signal process and wireless communications. At present, he serves as a Vice Chairman of China Institute of Communications and Director of the Academic Committee at China Institute of Communications.

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Joel Rodrigues is the Chair of the IEEE ComSoc Technical Committees on Communications Software and the Vice-chair of the IEEE ComSoc Technical Committees on eHealth, and Member Representative of the ComSoc on the IEEE Biometrics Council. He is the EiC of the *International Journal on E-Health and Medical Communications* and the *Recent Patents on Telecommunications* journal. He has been general chair and TPC Chair of many international conferences. He has authored or co-authored over 250 papers in refereed international journals and conferences, a book, and two patents. He had been awarded the Outstanding Leadership Award of IEEE GLOBECOM 2010 as CSSMA Symposium Co-Chair and several best papers awards.

Liang Zhou received his PhD degree major in Electronic Engineering from Ecole Normale Supérieure (E.N.S.), Cachan, France, and Shanghai Jiao Tong University, Shanghai, China, in March 2009. Currently, he is a Professor in Nanjing University of Posts and Telecommunications, Nanjing, China. His research interests are in the area of multimedia communications and networks. He serves as an editor for *IEEE Transactions on Circuits and Systems for Video Technology*, *IET Communications*, *Wireless Communications and Mobile Computing* etc.

It is predicted that there are 50 to 100 billion things that will be connected by 2020, and hence we are now at the cross section of a paradigm shift and observing the metamorphosis that everyday things are going through – from things that learned-to-do to things that are learning-to-think to things that will learn-to-perceive. Actually, the Internet of Things (IoT) technology is at the heart of this metamorphosis, and is rapidly gaining significant attention from academia, industries, and governments.

This exciting special issue has received a large number of submissions from an open call for papers that covered all topics of IoT. Due to page budget and timing constraints, many good quality works have been turned away, and eight papers have finally been selected after a careful and highly competitive review process. These papers are organised into three sections in this special issue, namely standard, technology, and application.

The first set of two papers describes the emerging IoT standard. The first paper, ‘Performance analysis of contention access period of IEEE 802.15.3 MAC protocol’, by Ullah, Chen and Alsalihi, analyses the performance of the CAP period using both analytical and simulation-based methods. In particular, it simulates CSMA/CA protocol in the CAP period using NS-2. The simulation results are compared with those obtained from analytical approximations in terms of different parameters including throughput and optimal CAP periods. The second paper, ‘Semantic interactions in the Internet of Things’, by Estrada-Martinez and Garcia-Macias, describes some possible scenarios of the IoT where users interact with smart objects in smart spaces. Importantly, it explains how semantic web technologies can be used for creating richer interactions and also presents the evaluation of our proposal by applying the concepts of this work in a system prototype.

The next set of three papers deals with IoT technologies. The paper ‘Energy-aware distributed scheduling for multimedia streaming over Internet of Things’, by Cui and Zheng, investigates the combination of the energy saving and distributed scheduling in a united convex optimisation formulation and propose energy-aware distributed scheduling scheme based on cross-layer design. It first develops an energy-aware distortion model which describes both the distortion resulting from the coder and transmission. Then, an optimal distributed scheduling scheme is realised by adapting the transmission rate with the transmission range and minimising the overall energy consumption. Moreover, extensive simulations are provided, which demonstrate the effectiveness of our proposed

energy-aware distributed scheduling in the context of IoT. Another paper, ‘Enabling cyber-physical systems with machine-to-machine technologies’, by Wan, Yan, Liu, Zhou, Lu and Li, first reviews several concepts and terms, including M2M, WSNs, CPS, and IoT. Then, it conducts a case study exemplified by home M2M networks, and outline the further research proposals of M2M communications. On this basis, a case of CPS, Human-Cyber-Physical System (HCPS) to achieve system safety and efficiency for connected vehicles, is proposed, and the research proposals and challenges for HCPS are summarised. The third paper, ‘A query-matching mechanism over out-of-order event stream in IOT’, by Wang and Yu, designs algorithms for generating and matching queries are proposed to raise accuracy in query-matching with relative low overhead and shorten the response time as much as possible. Simulation shows that the proposed mechanism is able to shorten response time and further improve matching accuracy over out-of-order event. Space complexity is also improved when the system is dealing with multiple queries.

The final set of three papers addresses IoT applications. The paper ‘Gatherer: an environmental monitoring application based on IPv6 using wireless sensor networks’, by Ramos, Foster, Felici-Castell, Fos and Solano, introduces the 6LowPAN standard to define IPv6 in wireless sensor networks, allowing their connection to internet. For this, the paper has designed an Environmental Monitoring application, called Gatherer, based on TinyOS using IPv6 and UDP protocols. Next paper ‘Intelligent context retrieval and management for services in the Internet of Things’, by Cadenas, Baladrón, Aguiar, Carro and Sánchez-Esguevillas, describes a Convergent Context Enabler (CCE) and specific details about the user’s context processing and the interfaces designed to support the architecture. In addition, a use case of context-aware services in the Internet of Things is presented and analysed in detail. The last paper, ‘Secure and scalable mobility management scheme for the Internet of Things integration in the future internet architecture’, by Jara, Kafle and Skarmeta, focuses on analysing the security challenges for the HIMALIS architecture, as ID/Locator management messages vulnerable to attacks. This analysis also considers the particularities from the Internet of Things, since it is a pillar of the Future Internet. Moreover, this work proposes a secure and scalable mobility management scheme that considers the necessities and constraints from the Internet of Things, solving the possible security and privacy vulnerabilities of the HIMALIS architecture. The

proposed scheme has been verified and evaluated successfully with the Automated Validation of Internet Security Protocols and Applications framework.

The guest editorial team would like to thank all authors for submitting their quality work to this special issue, and to the numerous reviewers whose hard work and expert

contributions are certainly the cornerstone in the quality of this successful special issue. Finally, special thanks go to Prof. Han-Chieh Chao and Prof. Yuh-Shyan Chen, Editors-in-Chief for approving and making this issue possible. We wish you a very pleasant read of the high quality papers presented in this issue.