

## Beyond the Internet of Things: Everything Interconnected: Technology, Communications and Computing

Series Editors: Giancarlo Fortino, Antonio Liotta, Jordi Batalla, George Mastorakis, Constandinos Mavromoustakis, Evangelos Pallis.; Springer International Publishing; 1st Edition; 2017; ISBN 978-3-319-50758-3; e-Book: 408 pages..

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The networked connection of people, things, processes, and data is called the Internet of Everything (IoE). It is projected to provide high revenues to many companies due to the increase of work efficiency, as well as the increase of security and comfort of workers. The sector-specific infrastructures where the IoE is successfully implemented are smart grid, critical infrastructure management, smart homes, smart manufacturing, and smart meters, among others. IoE is based on near Internet ubiquity and includes three types of connections: machine-to-machine, person-to-machine, and person-to-person. Machine-to-machine is closely related to security, including civil security (e.g., security on the road, disaster alert) and military security. Person-to-machine communication brings an unquestionable increase of well being in home automation systems but is also fundamental for intelligent parking, patient monitoring, and disaster response, among others. Person-to-person connection is already changing interpersonal relations, which are becoming more multimedia-centric and located in social networks. IoE will increase the scenarios of person-to-person networked communication; for example, telework, networked learning, and telemedicine. The future of the implementation of the IoE depends on the effective solution to a number of technical challenges that this paradigm introduces, which is discussed in the chapters in this book.

The first chapter of this book (Matos, Amaral, and Hessel), discusses the context-aware systems technologies and challenges in IoE environments. It provides a view of the best technologies that fit with the necessities of IoE environments and the new trends in the area. Also, this chapter introduces context-aware computing phases and life cycle and their significance in IoE environments, and the most useful technologies and existing work related to context awareness in IoE environments. In the second chapter of this book, Lu discusses the Internet Protocol stack and the communication stack, and how neither ever explicitly takes into account the context information of its dynamic end users, which affects protocol performance from the perspectives of both end users and networks. The author of this chapter also proposes a new functional module, named User-Context Module, to explicitly integrate the end user's context information into the established Internet Protocol stack. The third chapter (Samaila *et al.*) discusses the security challenges of the IoT, in which the authors introduce some basic concepts of security and security requirements in the context of IoT. They also consider fundamental security issues in the IoT and highlight the issues that need immediate attention, namely heterogeneity, large data volumes, and lack of broad-based security.

In the fourth chapter, Khoueiry and Soleymani explore machine-to-machine communication using rateless coding, and discuss communication strategies that could considerably increase the efficiency of the channels in a multicast setting, namely via low-cost relay by neighbors. Furthermore, an efficiently scalable technique for disseminating information among a large number of devices is proposed as well. In the fifth chapter, Sarwesh, Shet, and Chandrasekaran discuss energy-efficient network architectures for IoT applications and the challenge

for energy constrained IoT networks. The author proposes two different techniques, node placement and routing in a single network architecture, to improve the lifetime of IoT networks. Splitting the energy related parameters into two different techniques (node placement technique and routing technique) highly reduces the complexity of the network, improving the uniform energy consumption and providing better network lifetime. In the sixth chapter (Gajewski *et al.*), the authors describe the design, implementation, and test results of an ID-based communication network with particular emphasis on sensors interworking and its application in home automation and intelligent buildings to increase comfort at home and productivity at work. The authors consider scenarios where the network structure is aligned to a building structure and used a hierarchized addressing structure based on unique identifiers to benefit from an information-centric network based architecture.

The seventh chapter (Nowicki and Uhl) discusses applications in IoT, namely triple play services (audio, video, data) such as VoIP audio applications, VTolP, and IPTV video streaming. The chapter also discusses important techniques for measuring quality of service/experience (QoS/QoE) in VoIP, VTolP/IPTV, and web applications. In the eighth chapter, Roy and Chowdhury present a roadmap of key developments in IoT-cloud research in the context of different application domains and their applicability to IoE. Also discussed are the different layers of the IoT protocol stack, the challenges of moving large amounts of data into the cloud, and computational and storage resources needed (with existing works as examples). In the ninth chapter (Lobato, Resende, Nascimento, Siqueira, Jacob and Santana), the authors discuss sleep disorders and detection and assessment methods using a low-cost alternative multimodal low-invasive system for sleep quality monitoring and its improvement by the Internet of Things paradigm. A standalone device was designed to provide robustness, scalability, and usability to a completely built-in sleep assessment system. The main goal of this in-home device is to give more accurate information to physicians and technical staff, assisting in the screening process, reducing costs, and helping to improve the well being of people with sleep disorders.

The 10th chapter is about real-time implementation of emotion detection algorithms in IoT, where Zoican describes the methods of detecting human emotion using signal processing techniques and their implementation in real time using face images and speech signals. Also, the chapter describes the architectures of microcontrollers used to implement the algorithms for emotion detection and the methods for code optimization, and estimates the computational effort and memory requirements for image and speech processing involved in emotion detection. In the 11th chapter (Vavouranakis *et al.*), the authors present a methodology for recognizing driving patterns using smartphones, and discuss in detail an Android-based application developed to monitor driving behavior. The app can recognize multiple driving events and stores all the data for later review. It organizes drivers in an online social network and involves them in a game-like procedure for promoting and rewarding the best drivers, which can motivate drivers toward better driving behavior. In the 12th chapter, Manashty and Thompson discuss the growing elderly population, and research in healthcare monitoring and ambient assisted living technologies to provide improved care while at the same time containing healthcare costs. They also discuss the complexity involved in sharing data between different systems and the challenge of storing information in the cloud. The ultimate goal of these systems is to bridge the gap between symptoms and diagnosis trend data in order to accurately and quickly predict health anomalies.

In the 13th chapter (Krawiec *et al.*), the authors discuss

the Web of Things (WoT), considering it as a step toward IoT development. The concept of WoT assumes that objects of the Internet of Things (IoT) seamlessly interact with the web by reusing web protocols wherever possible. This chapter also provides an overview of the protocols for real-time interaction of WoT objects and describes two technologies, WebSocket and WebRTC, which are a part of the HTML5 specification and are considered as solutions for real-time WoT communications. In the 14th chapter (Ziouvelou *et al.*), the authors examine the use, design, and development of mobile crowdsensing-based crowd ecosystems. In this model, there have been attempts to create open, collaborative innovation practices to enable an increasing number of users to mutually collaborate by openly communicating their ideas, sharing best practices, and creating new knowledge across sectors. These online, distributed, crowd-driven networks take advantage of underlying network

effects in order to harness the collective power and intelligence of the crowd. In the 15th chapter, Meridou *et al.* present an ecosystem built over the idea of IoT featuring a collaborative, intelligent service bus, which gathers information from connected devices and uses it to improve quality of life. All aspects related to data collection, processing, protection of privacy, as well as collaboration between users and interfacing between humans and devices are discussed, while mechanisms supporting decision making toward health related goals are presented.

In conclusion, this book broadly paints the developments and advances in the Internet of Things technology and its uses, and offers a clear picture of methodologies with plenty of examples. It covers a wide array of technologies, including smart devices, wireless sensors, communications systems, networks and protocols, and computing from theory to applications, which provides a new reader in the area very good perspective on the breadth of the area.

#### CALL FOR PAPERS

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### 5G TESTING AND FIELD TRIALS

#### BACKGROUND

The coming 5G era will boosting both the personal broadband mobile communications and the industry utilizations greatly. According to the time table defined in ITU, the proposals for 5G systems must be submitted in 2019, and they will be then evaluated to make a final IMT-2020 specifications by the end of 2020. The evaluation will be based on certain evaluation criteria including key performance indicators (KPIs). The different usage scenarios of 5G will set different priorities for the KPIs. Also, the key new features brought by the 5G systems, such as mmWave and 5G New Radio, will highly impact those KPIs. Testing and field trials are essentially demanding to evaluate the KPIs, and the related technologies have attracted more and more attention from both the academia and industry. To reflect recent research advances on the 5G testing and field trials, this special issue calls for original papers with contributions in, but not limit to, the following topics:

- Testing and field trials environment building for 5G, including testing network architecture and deployment, wireless propagation modeling and measurements.
- Development of testing tools and algorithms for 5G, including testing instruments design, software development, programming languages and models, trouble shooting tools, and various algorithms for testing and field trials.
- Testing and field trial cases design for 5G, including new KPIs and metrics defining to meet the challenges such as the massive scalability and the ultra-reliability, methodologies for measurement and calculation of the new KPIs and metrics.
- Vertical business use cases of 5G testing and field trials, including spectrum management, policy control and charging, security and privacy, services and applications, and techno-economic analysis.
- Testing and field trials of 5G with other wireless networks, including converged broadcasting and mobile networks, and other various heterogeneous networks.
- Progresses in standardization (including ITU, 3GPP, IEEE, ETSI, ONF and etc.), related to 5G testing and field trials.

#### SUBMISSIONS

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#### IMPORTANT DATES

- Submission Deadline: February 1, 2018
- Initial Decision: April 10, 2018
- Revised Manuscript Due: May 15, 2018
- Final Decision: June 15, 2018
- Final Manuscript Due: July 10, 2018
- Publication: October 2018

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