

## Editorial

# Internet of Things

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We are witnessing the dawn of a new era of Internet of Things (IoT; also known as Internet of Objects). Generally speaking, IoT refers to the networked interconnection of everyday objects, which are often equipped with ubiquitous intelligence. IoT will increase the ubiquity of the Internet by integrating every object for interaction via embedded systems, which leads to a highly distributed network of devices communicating with human beings as well as other devices. Thanks to rapid advances in underlying technologies, IoT is opening tremendous opportunities for a large number of novel applications that promise to improve the quality of our lives. In recent years, IoT has gained much attention from researchers and practitioners from around the world.

This special issue is focused on the latest results in the area of IoT. In response to our call for papers, we have received a very large number of submissions, out of which eight papers are finally accepted as a result of a thorough review process by international experts in respective areas. The selection provides a fresh snapshot of the state-of-the-art research in the field.

Radio frequency identification is a dispensable technology for IoT. In the paper ‘Code division multiple access/pulse position modulation ultra-wideband radio frequency identification for Internet of Things: concept and analysis’, Zhang *et al.* propose to utilize low-pulse-rate code division multiple-access/pulse position modulation ultra-wideband in the tag-to-reader link to provide multiple tag access capability and build a high-throughput radio frequency identification system for IoT. To optimize the network throughput, they design an effective Medium Access Control protocol as well as a dynamic frame size adjustment algorithm.

Channel assignment can considerably affect network throughput. The paper ‘A dynamic channel assignment strategy based on cross-layer design for wireless mesh networks’ deals with this issue, with focus on allocating channels according to the status of adjacent links, that is, dynamic channel assignment. The authors propose a routing-information-aware channel assignment algorithm based on a cross-layer design. The proposed method can dynamically allocate channels for wireless nodes when they need communications and release channels after data transmission. In this way, limited channel resources can be used efficiently by more wireless nodes. As a consequence, the communication throughput can be improved.

Collisions and interferences among nodes pose a challenge for data aggregation in many applications. The paper ‘An energy efficient medium access control protocol for target tracking based on dynamic convey tree collaboration in wireless sensor networks’ addresses this issue. The authors refine slot allocation to nodes in a dynamic convey tree and design an energy-efficient Medium Access Control protocol called dynamic-time division multiple access. The dynamic-time division multiple-access protocol avoids collisions and interferences and allocates contiguous active slots to nodes as far as possible during data aggregation from leaf nodes to a root node. As a result, energy consumption in switching from sleep to active state can be reduced.

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Localization based on received signal strength indication is a low-cost and low-complexity technology. With the increasing popularity of location-based services, this technology has become more and more important, especially in the context of IoT. In the paper 'A localization strategy based on  $n$ -times trilateral centroid with weight', Qiu *et al.* present the  $N$ -times trilateral centroid weighted localization algorithm, which can reduce the localization error considerably.

Security remains one of the most important issues that baffle the development and applications of IoT. In the paper 'An integrated scheme based on service classification in pervasive mobile services', Liu *et al.* deal with how to protect the user's security in pervasive mobile contexts. To address this issue, the authors propose a trust model in which the billing or trust operator works as an agent to provide trust authentication for all service providers.

The emerging standard 6LoWPAN allows a vast number of smart objects to be deployed using the huge address space of IPv6 for data and information harvesting through the Internet. In the paper '6LoWPAN: a study on QoS security threats and countermeasures using intrusion detection system approach', Le *et al.* analyze potential security threats in 6LoWPAN and review the current countermeasures, in particular, the intrusion detection system (IDS) based solutions for countering insider/internal threats. They discover three novel QoS-related security threats and introduce a new two-layer IDS concept as a countermeasure method for securing the routing protocol for low-power and lossy network-built network topology from the internal QoS attacks.

Experimentation infrastructures play a very important role in performance evaluation of IoT solutions. In the paper 'NetEye: a user-centered wireless sensor network testbed for high-fidelity, robust experimentation', Ju *et al.* develop the NetEye testbed as a high-fidelity, robust wireless sensor network experimentation infrastructure that provides ease of scientific experimentation. It is worth mentioning that NetEye contains a health-monitoring service NetEye Doctor that monitors hardware and software status; the real-time health monitoring information about the testbed is seamlessly integrated with the life cycle of experiment scheduling, experiment status monitoring, and experiment data analysis for both robust experimentation and informed experiment analysis.

In the paper 'Technology classification, industry, and education for Future Internet of Things', Ning and Hu present a vision on the worldwide rapid development of IoT. They propose two models for future IoT. A dimension model is established to classify the complicated IoT technologies, and a layer model is built for future IoT system architecture. They argue that IoT is a new stage of intelligentization and informatization development. With regard to IoT education, they discuss the problem of setting IoT as a major/discipline in college and give some suggestions.

It has been a great pleasure for us to organize this special issue. We would like to thank Professor Mohammad S. Obaidat, Editor-in-Chief of *International Journal of Communication Systems*, for giving us this opportunity. We are very grateful to Production Editors at John Wiley & Sons for their help in managing this issue. We also thank all authors for their submissions and all reviewers for their diligent work in evaluating these submissions. We sincerely hope that you enjoy reading this issue.

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