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Editorial

The Emergence of Internet of Things (IoT): Connecting Anything, Anywhere

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Abstract: Internet of Things (IoT) plays the role of an expert's technical tool by empowering physical resources into smart entities through existing network infrastructures. Its prime focus is to provide smart and seamless services at the user end without any interruption. The IoT paradigm is aimed at formulating a complex information system with the combination of sensor data acquisition, efficient data exchange through networking, machine learning, artificial intelligence, big data, and clouds. Conversely, collecting information and maintaining the confidentiality of an independent entity, and then running together with privacy and security provision in IoT is the main concerning issue. Thus, new challenges of using and advancing existing technologies, such as new applications and using policies, cloud computing, smart vehicular system, protective protocols, analytics tools for IoT-generated data, communication protocols, etc., deserve further investigation. This Special Issue reviews the latest contributions of IoT application frameworks and the advancement of their supporting technology. It is extremely imperative for academic and industrial stakeholders to propagate solutions that can leverage the opportunities and minimize the challenges in terms of using this state-of-the-art technological development.

Keywords: IoT; smart environment; security and surveillance

We are living in a new era of computing, information, and communication technology, that, as many are saying, pushes forward seamless interaction between humans, nature, and physical objects and is captured within the ecosystems of Internet of Things (IoT). The anticipated rich connectivity of environment-to-machine, machine-to-machine, and machine-to-backbone internet infrastructure starts to be seen and developed almost everywhere in the world. As a result, massive amounts of data is being propagated, which are being subsequently processed into some useful decision-making and intelligent actions to make our lives easier and safer [1]. Concurrently, however, the massive amount of data being exchanged as well as the way it is being processed in the cloud and edge devices of IoT platforms may not always leverage upon secure and reliable protocols and mechanism.

This Special Issue addresses the research and development of the latest contributions to IoT application agendas and the corresponding supporting technology where many issues are being inherited by IoT due to enabling smart applications.

Among the submissions received, all of which went through a rigorous peer-review process, five papers have been selected for publication. In a manuscript entitled "Resource Allocation Model for Sensor Clouds under the Sensing as a Service Paradigm", the authors considered data sharing

issues embedded within sensor and cloud environment and attempted to design a service-oriented model based on sensing functionality [2]. The paper "Making Sense of the World: Framing Models for Trustworthy Sensor-Driven Systems", facilitates the introduction of two important concepts, namely frames of reference and frames of function that can be used to assist in organizing sensor-driven models and their intended uses [3]. The article "Ontology Middleware for Integration of IoT Healthcare Information Systems in EHR Systems" describes IoT facilities for Electronic Healthcare Record (EHR) to improve the healthcare service by provisioning towards out-of-clinic automatic monitoring services to the patients [4]. In the manuscript "Performance Evaluation of HARQ Schemes for the Internet of Things", the authors sought to provide a comprehensive performance comparison of power-constrained short-packet Hybrid Automatic Repeat reQuest (HARQ) transmission schemes, tailored for IoT applications [5]. To conclude, the paper "Connecting Smart Objects in IoT Architectures by Screen Remote Monitoring and Control" considered remote control and monitoring issues for IoT-enabled intelligent streaming services and proposed middleware organizational structure with multiple platform compatibility [6].

The papers are described in more detail as follows:

1. Resource Allocation Model for Sensor Clouds under the Sensing as a Service Paradigm, by Joel Guerreiro, Luís Rodrigues and Noélia Correia

The Internet of things (IoT) produces so many verses of service for sensing and data sharing purposes. In this proposed scheme, a resource model is designed for procuring sensors as well as cloud stores toward the client's end. This model has taken into account an emerging IoT based multi-sensing function and mashups of things at the cloud for supporting of a business model. Based on the heuristic algorithm, it can integrate the allocation of most suitable devices according to the needs of the application at the same time.

2. Making Sense of the World: Framing Models for Trustworthy Sensor-Driven Systems, by Muffy Calder, Simon Dobson, Michael Fisher, and Julie McCann

A sensor device can produce information and data that can simplify real-time decision making and actuate independent action and policies. In this paper, the authors theorized two features, namely frames of references and frames of function. Their approach inherently implies frames-aided communications between modelers and analysts, as well as relevant parties, and further differentiates the objective and use of each model that can confide the purpose of the system requirements.

3. Ontology Middleware for Integration of IoT Healthcare Information Systems in EHR Systems, by Abdullah Alamri

IoT has obtained a leading acceptance to provide effectual support in healthcare to affirm diagnosis and treatment. The IoT technology can procure the data from patients, and can incorporate an electronic healthcare records (EHR) system. However, the majority of the existing EHR systems are not able to desegregate with IoT services to maintain a patient-centric support system. Therefore, the availability of IoT in EHR can improve patience healthcare by facilitating a remote monitoring system of patients, who are located outside the clinic. From this facility, the physician is able to retrieve data from the patient via an IoT connection and, more significantly, the IoT platform may offer authentic interoperability and incorporeality. Finally, this research proposed a mechanism to assist in semantically integrating and enabling collaboration between IoT healthcare and EHR systems.

4. Performance Evaluation of HARQ Schemes for the Internet of Things, by Lorenzo Vangelista and Marco Centenaro

The long-term evolution of cellular technologies is based on the HARQ, which is a widely used medium access control scheme for wireless communications. Despite becoming enormously popular,

the data block length settings of a HARQ scheme still leave room for further investigation. In particular, the new communication trends of IoT model require short packet (low latency) and ultra-reliability (low bit error rate), which motivate research in designing and implementing more efficient HARQ schemes. This research provides a complete comparison of several types of power-constrained HARQ, emphasizing the use of short packet transmission. The authors derived optimal power allocation strategies (OPAS) and achieved 50% energy saving after bidding a few transmissions and enabling combined packets at the receiver end.

5. Connecting Smart Objects in IoT Architectures by Screen Remote Monitoring and Control, by Zebo Yang and Tatsuo Nakajima

In the area of touch-screen interaction of multimedia outputs, the electronic visual display is very popular. It is convenient to gain control with an intelligent machine through the support of display content. Remote screen sharing is very much predominant today. This paper proposes a middleware arrangement based on remote streaming and facilitating maintenance of the control and monitoring functionalities of artificially intelligent devices and appliances, such as smart home, smart TV, smart watch, smart refrigerator, etc. This method provides a remote controlling and monitoring system for a particular device selected from all the connected devices. The platform has been implemented as a distributed network, containing several modules of servers and clients, and is compatible across different operating systems, including Linux, MacOS, Windows, etc.

As we know that the concept of IoT is exploited in different domains of research [7–12]; however, it is still in its infancy. Many open research issues can be solved using this technology; therefore, we will further prepare some interesting Special Issues in the same domain.

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