Preface

Antonio F. Skarmeta and Antonio J. Jara*

Computer Science Faculty,
University of Murcia,
Campus de Espinardo, ES-30600 Murcia, Spain
Email: skarmeta@um.es
Email: jara@um.es
*Corresponding author

Biographical notes: Antonio F. Skarmeta received the MS degree in Computer Science from the University of Granada and BS (Hons.) and the PhD degrees in Computer Science from the University of Murcia Spain. Since 1993 he is Professor at the same department.

Antonio J. Jara is PostDoc at University of Applied Sciences Western Switzerland (HES-SO) from Switzerland, vice-chair of the IEEE Communications Society Internet of Things Technical Committee. He did his PhD (Cum Laude) at the University of Murcia (UMU), Spain.

Future internet presents a more ubiquitous, social, and physical internet. The potential of the future internet is not limited to smart phones, HDTV, and 3D. The Internet of Things (IoT) is another emerging area of the future internet, which is offering a higher integration of the cybernetic and physical world.

This special issue presents the last advances in the Internet of Things, i.e., the Web of Things (WoT), which is an evolution of the Internet of Things to offer ubiquitous access to the interconnected smart objects (e.g., personal devices and appliances) from everywhere, through web technologies such as HTTP, RESTFul architectures, and new protocols based on RESTFul foundations such as CoAP, which takes into account the constrains and new requirements from the devices and systems that compose the IoT.

This special issue will present from general architecture requirements, to solutions that satisfy specific needs from novel applications, in order to make feasible the integration of these technologies into emerging scenarios such as Smart Cities. In particular, some works dedicate special attention to the semantic and coordination needs from the Internet of Things, which are being reached through the web technologies, and finally, it is proposed how to integrate the IoT with the cloud, offer coordination among heterogeneous resources, and provide an additional value to the Internet of Things with the flexibility, ubiquity, and benefits of the web.

In details, the first work, entitled 'IoT4S: a new architecture to exploit sensing capabilities in smart cities' is coming from the University of Messina (Italy), this work presents a new architecture, called IoT4S, for the management and storage of all the environmental information collected through several heterogeneous sensing devices. This work presents the coming needs from the IoT and Web of Things, to be linked in an architectural level with the cloud computing, and data-warehouses.

The second work is entitled 'Design principles for utility-driven services and cloud-based computing modelling for the Internet of Things', from Digital Enterprise Research Institute – DERI (Ireland), and Athens Information Technology (Greece), presents the last results from the OpenIoT EU Project regarding the proposed framework and its operational components applying Linked Sensor Data technologies, and standards such as the W3C Semantic Sensor Networks ontology. This presents as Web of Things facilitates the integration between cloud, heterogeneous sensors and real applications.

The third work is entitled 'Resolving coordination challenges in distributed mobile service executions', which comes from Technical University of Madrid, presents as solve the coordination challenges in the IoT environments, featured by loose-coupled object interconnection between the control and data planes. This contribution defines a coordination model and proposes solutions to these challenges by developing a cooperative service execution model for mobile environments.

The fourth work, entitled 'Energy-aware architecture for information search in the semantic web of things' is coming from the Deusto Institute of Technology – DeustoTech, University of Deusto (Spain). This work proposes a dynamic architecture to search semantically annotated data in the WoT, since WoT proposes to use well-established web standards to ease their communication. In addition, they propose annotate data semantically in the WoT, in order to overcome the difficult presented when heterogeneous devices are using different protocols.

The fifth work, entitled 'Enabling the web of things: facilitating deployment, discovery and resource access to IoT objects using embedded web services' from Ghent University (IBBT) in Belgium, presents a novel self-organisation solution to facilitate the deployment of constrained networks and enable the discovery, end-to-end connectivity and service usage of these newly deployed sensor nodes. By using embedded web service technology, the need of other protocols on these resource constrained devices is avoided. This approach is based on CoAP, which is the most extended protocol to enable the WoT.

Finally, the sixth work, entitled 'Semantic Web of Things: an analysis of the application semantics for the IoT *moving towards the IoT convergence*' from the University of Applied Sciences Western Switzerland, Technical University of Vienna (Austria), and University of Murcia (Spain), presents the Semantic Web of Things (SWoT), as the evolution after the WoT in order to offer an IoT convergence in terms of heterogeneous device integration, device abstraction and the different semantic descriptions available for the IoT. Specifically, they analyse the trends for capillary networks, with standards such as IPSO Application Framework and ZigBee-IP, and for cellular networks with standards such as OMA Device Management and the oneM2M initiative. This work also defines the vision for future steps of the SWoT to take advantage of its potential for high-level modeling and knowledge engineering with techniques such as the Big Data.

To sum up, this special issue has collected sic top papers from the main institutions, projects and standardisation bodies working on the Web of Things. These works present a bottom-up approach covering from the Web of Things fundaments based on its integration with the architectures such as IoT4S, in order to exploit the IoT and WoT in emerging scenarios such as smart cities, then this is presented the needs to integrate the IoT with other parts of the existing enablers such as the cloud computing and data

warehousing. All the integration of devices present coordination and integration problems, for which also are proposed solutions, and finally they are presented different techniques to annotate and describe the semantic part of the Web of Things, concluding with a review of all the existing standards, exhaustive evaluation of all of them, and finally a visionary description of the future of the Web of Things, towards a Semantic Web of Things.