2013

Wireless Sensor networks and the Internet of Things

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It is estimated that mobile internet devices that can act as sensors will outnumber humans this year (2013), and by 2015, there will be about 15 billion internet-connected devices. Related applications are thriving in commercial, civic, and scientific operations that involve sensors, web, and services, leading by both academic societies and industry companies. It is commonly accepted that the next generation of internet is becoming the “Internet of Things (IoT)” which is a worldwide network of interconnected objects and their virtual representations uniquely addressable based on standard communication protocols. Identified by a unique address, any object including computers, mobile phones, RFID tagged devices, and especially Wireless Sensor Networks (WSN) will be able to dynamically join the network, collaborate, and cooperate efficiently to achieve different tasks. With all these objects in the world equipped with tiny identifying devices, daily life on earth would undergo a big transformation.

To achieve this vision, there is a need for scalable and interoperable networking systems to support the challenging requirements for future internet and web: secure, reliable, energy-efficient and cost-effective large-scale sensor networks, machine-to-machine communications, and information networking architectures suitable for low end devices through to high end consumers.

The purpose of this special issue thus is to report on the recent and original advances on WSN and IoT that are to be innovative to open the new era of the Internet of Things. From the many submissions we received, a number of exciting manuscripts stood out for their relevance and technical significance. These accepted papers touched upon three WSN and IoT areas: IoT network infrastructure, related hardware design, and IoT protocols.

Á. Asensio et al. discussed the wireless sensor node architecture hardware design criterion based on energy analysis according to the specific requirements of an application.

C. Liu et al. proposed a novel WSN authentication scheme based on the quadratic residues theory, which uses the master key to achieve simple symmetric cryptographic primitives and authentication operation for aims of great resistance against the attacks and low energy consumption.

F. T. Lin proposed a method to tackle the dying nodes as well as the cost, specifically a holes healing scheme.

C. Xu proposes a novel Vehicular Network-based CMT solution based on a CMT disorder analytic model which can effectively and accurately evaluate the degree of out-of-order data.

S. Yin proposed two digital calibration and compensation techniques for low-power wireless multiband transceiver to adjust the VCO’s tuning curves in the frequency synthesizer and eliminate the DC offset voltage in the intermediate frequency pathway.

J. Zhang proposed an energy-efficient distributed algorithm for virtual backbone construction with cellular structure WSN, which combines optimal coverage theory based on cellular structure and energy consumption model for different kinds of sensor nodes to achieve the construction and rotation of backbone in multiple rounds.

By compiling these papers we hope to enrich our readers and researchers with latest innovative ideas with respect to the future Wireless Sensor Network and Internet of Things.

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