Guest Editorial

Internet of Things: Hardware and Software Solutions

Petar Šolić, Toni Perković, Renato Ferrero, Luigi Patrono, and May El Barachi

To enable Internet of Things in its full capacities, an efficient hardware and software architecture, and its incremental improvements are the necessity. This comes as a urging need to create operable and efficient network of billions of sensors connected to the Internet, representing a fundamental feature of the digital world we know today. At the end, objects connected in a smart way create an environment where object knows what we want, what we like, or what we need, while acting accordingly without causing burden on the user side. Many conventional concepts are changing: Human-to-Machine paradigm (H2M) is increasingly shifting toward the new Machine-to-Machine (M2M) paradigm, while The Next Generation Internet currently aims at interconnecting and making smart objects interoperable in order to realize the vision of the Internet of Things (IoT) at the full capacities. To cope with these issues this Special Issue gathered different contributions that incrementally improve current infrastructures:

In paper "Decentralization of Services Through Three Tiers in Wireless Body Area Networks", authored by Said Lakhal and Zouhair Guennoun present a functional architecture for Wireless Body Area Network (WBAN) consisted of three layers: closest, intermediate and farthest. The way it is presented maximises the use of the available resources in respect to the conventional single layer or at two layers architectures.

Paper "A Level-Wise Periodic Tree Construction Mechanism for Sleep Scheduling in WSN", authored by Nachiketa Tarasia, Amulya Ratna Swain, Soham Roy, and Udit Narayana Kar deals with the more efficient network of wirelessly connected sensors in order to improve their energy efficiency. In particular, authors proposed a level wise periodic tree construction algorithm that uses a specific set of nodes to participate in tree construction. The main idea is to put the nodes, which are currently active and have already spent a significant amount of energy, to sleep mode, while giving chances to the leaf nodes, which have comparatively spent less energy, to become active nodes and maintain connectivity. The performance analysis provides promising results.

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As the issues that arise in the wireless channels may cause different difficulties, the paper "Performance of the Product of Three Nakagami-m Random Variables", provided by Dragana Krstic, Petar Nikolic, Ivan Vulic, Sinisa Minic, and Mihajlo Stefanovic shows the fading-effect influence in a particular channel model. The contributions were presented in an appropriate closed forms where the first moment is the mean of the signal; the second moment is the average power of the signal, and the third moment is skewness - which all together were used to calculate, analyse and finally discuss the Amount of Fading (AoF).

As the hardware is a root of smart and sustainable IoT environments, the paper "Performance of a New Design Based on Substrate-Integrated Waveguide Slotted Antenna Arrays for Dual-Band Applications (Ku / K)" authored by Turkiya Abes, Keltouma Nouri, Boubaker Seddik Bouazza, and Kada Becharef, discusses the novel concept for SIW array antenna. Given 2x2 array antenna gives a return loss about (-20 dB), a high gain of 9.05 dB, and two bandwidth equals 210 MHz and 1310 MHz respectively at both of the operating bands. Validation of the simulated was conducted using the time-domain solver of the CST Microwave Studio (MWS) full-wave simulator. Simulation results obtained from the two softwares having different solvers were in good agreement in the results.

Another contribution "Evaluation of ZigBee Topology Effect on Throughput and End to End Delay Due to Different Transmission Bands for IoT Applications" authored by Yehia R. Hamdy, and Ahmed I. Alghannam, deals with the communication efficiency in the ZigBee topologies and analyses End-to-End delay and throughput for different transmission bands. The results of the given study recommend which topology should be used at each transmission band to provide lowest End-to-End delay or obtain maximum throughput, which is case sensitive in some IoT applications that required for example minimum delay time or sending high amount of data (will be published in September issue).

Finally, the paper "Security Enhancement in Cloud Environment using Secure Secret Key Sharing" authored by Sakshi Chhabra, and Ashutosh Kumar Singh deals with Secure Secret Sharing (SSS) technique which is being recognised as one of the leading methods to secure the sensitive data in a cloud storage. The proposed methodology shares encrypted data over cloud and generated secret key is split into different parts given to qualified participants (Qn) analyzed by the index buffer and the malicious checkers. Authors have considered two benchmarks in the experiment for testing and analysing the results. The performance is evaluated based on time

consumption and probability computation to prove the efficacy of given algorithm (will be published in September issue).

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