Editorial

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Recently, due to the limited natural resources, the concept '*green*' has been widely used to solve problems of global energy shortage, abnormal weather and environmental pollution. In the meantime, Wireless Sensor Networks (WSNs) have also been regarded as one of the feasible solutions to sense or monitor if our planet is back to green after certain green technologies have been employed. However, one of the prerequisites for WSNs to play this important role is that the WSN itself has to be green. Thus, novel technologies, architectures and applications are required to design a green WSN (GWSN). After two rounds of review processes, in this Special Issue, we select ten papers that address different issues in designing GWSN.

In the first paper, Kafetzoglou and Papavassiliou propose a framework that employs the cross-layer approach between the application layer and the MAC layer to achieve energy-efficient/green data gathering in WSNs. The simulation results show that the proposed framework provides robustness among various system parameters such as energy consumption, end to end delay and packet success delivery probability, according to the specific constraints imposed by the application and corresponding underlying environment.

In the second paper, Krontiris and Dimitriou propose a secure code dissemination protocol, Scatter, that avoids the use of Elliptic Key Cryptography and manages to surpass all previous attempts for secure code dissemination in terms of energy consumption, memory and time efficiency. Experimental results demonstrate that Scatter is an efficient and practical green solution since it allows the fast code dissemination that Deluge offers, adding only a small overhead.

In the third paper, Boubiche and Bilami present a new routing protocol called HEEP which combines LEACH and PEGASIS algorithms. HEEP organises the network nodes in chains clusters, avoids the bad energy dissipation in LEACH protocol and reduces the routing delay generated by PEGASIS protocol. The experimental results show that HEEP is green since it outperforms LEACH and LEACH-C with more 110% of network lifetime, and reduces the routing delay introduced in PEGASIS by 50%.

In the fourth paper, Soliman and Al-Otaibi introduce two replacement mechanisms, reactive self-repairing AODV (AODV-RSR) and pre-emptive self-repairing AODV (AODV-PSR), to the local repair phase of the AODV. These two mechanisms are regarded as green since they can find an alternative link to a failing link without depending only on broadcasting RREQ packets. Furthermore, experimental results show that the introduced AODV-RSR and AODV-PSR achieve better performance than the AODV-LR and SRAODV by obtaining lower packet delay, higher packet delivery ratio, and lower control message overhead.

In the fifth paper, Jaggi and Kar consider the design of efficient algorithms for multi-sensor activation in order to optimise the overall event detection probability. By analysing certain classes of threshold activation policies, the ideas in this paper are green since they achieve near-optimal performance in presence of uncertainties in event and recharge processes.

In the sixth paper, Lu, Wu and Chen propose a cluster-based algorithm to implement the GWSN. The proposed algorithm is regarded as green since it energy efficiently identifies the redundant nodes in dense sensor networks so that not only the network lifetime can be prolonged but the lower sensing coverage ratio can also be achieved.

In the seventh paper, Morreale, Qi and Croft develop a GWSN for environmental monitoring and risk identification by decreasing amount of communication required between network nodes. The sensor network applications in this paper also provide an outstanding representation of green networking.

In the eighth paper, Wódczak employs the concept of cooperative transmission and the notion of autonomicity into the design of WSNs. By selecting the Optimised Link State Routing protocol (OLSR) as a pilot example, the proposed ideas have been confirmed to be green in terms of conserving energy and improving transmission capabilities to facilitate smooth and durable system operation.

In the ninth paper, Poornima and Amberker propose two schemes, Simple Secure Logical Ring (SSLR) and Burmester Desmedt Logical Ring (BDLR), for key management in clustered sensor networks with changing cluster head. The SSLR scheme is green in the sense that the communication and computation cost incurred for key establishment is constant. The BDLR scheme is said to be green since the key establishment is achieved by performing $(n + 1)$ multiplications and $(n + 5)$ communications, where n is the number of nodes in the cluster.

In the last paper, Li models the resources allocated to the users with the balance of the trade-off between system capacity and user fairness as an optimisation problem. Then, he decomposes the optimisation problem into two sub-problems of opportunistic relaying strategy and power allocation and proposes a low-complexity scheme to solve them. The simulation result shows that the proposed algorithm can both improve the system throughput and ensure the fairness.

We would like to thank the authors for submitting and revising their work, and all the referees for their careful reviewing. We deeply appreciate the Editor-in-Chief of *IJSNet*, Prof. Yang Xiao, who gave us the opportunity to edit this special issue. Last, but not the least, we would also like to thank all the staff in editorial office for their kind help in publishing this issue.