Editorial

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Biographical notes: Abdelouahid Derhab received his Engineer, Masters, and PhD in Computer Science from the University of Sciences and Technology Houari Boumediene (USTHB), Algiers, Algeria in 2001, 2003, and 2007, respectively. He is currently a full-time researcher at CERIST Research Centre in Algiers. His research interests lay in the field of ad-hoc and sensor networks, especially in topics like: routing protocols, data management, network deployment and coverage, localisation, sensor-actor coordination, quality of service, and security. He is the author of many journal papers and peer-reviewed conference papers in these topics. He served on the programme committee for a number of conferences and workshops. He also served as a guest editor for an international journal and chair of three editions of IWSN workshop in conjunction with IEEE DCOSS.

Djamel Djenouri obtained his PhD from USTHB, Algiers, in 2007. During 2008–2009, he was granted by ERCIM a post-doctoral fellowship at NTNU, Trondheim, Norway, where he participated in the MELODY project, supported by the Norwegian Research Council. Currently, he is a permanent full-time Researcher at CERIST, Algiers. His researches focus on wireless and sensor networking. He is a professional member of the ACM. In 2008, he was granted the Best Publication Award by ANDRU and CERIST Best Researcher Awards in 2010. He served as TPC/Chair of many international conferences/workshops.

Jianguo Ding currently works as a Senior Researcher at the Interdisciplinary Centre for Security, Reliability and Trust of University of Luxembourg. He received his Doctor Engineer (Dr-Ing) degree in Electronic Engineering from the Faculty of Mathematics and Computer Science of University of Hagen, Germany. He was a European Research Consortium for Informatics and Mathematics (ERCIM) 'Alain Bensoussan' Postdoctoral Fellow. He is a senior member of the IEEE and a member of the ACM. His current research interests include network management and control, wireless and mobile networks, network security, network performance evaluation, intelligent technology, software engineering and probabilistic reasoning.

We lately witness a tremendous development in the wireless sensor networking (WSN), which makes it possible to monitor the physical environment unobtrusively and for long periods of time. Ensuring high connectivity between the networks is vital for real applications. Moreover, for many applications, sensor networks cannot operate in complete isolation. There must be a way for enabling a monitoring entity or some end-users to gain access to the data produced by the sensor networks, and even to interact with a particular sensor mote and to activate/deactivate it, to read the sensed values instantaneously, to fix some inner parameters, to make dynamic code loading into the mote, etc. It is expected that the interconnection would be straightforward in heterogeneous networks between a sensor network and an existing network infrastructure such as a local-area network, a private intranet, mobile network infrastructures, unmanned aerial vehicles (UAVs), RFID tags/readers, and notably the global internet.

This special issue targets all aspects related to interconnection of wireless sensor networks. We received 15 submissions from an open call. After a thorough reviewing process where every paper has been evaluated by at least three experts, six papers have been conditionally accepted, subject to some revisions. Reviewers' comments were very helpful first to select the most significant contribution, then to improve the presentation quality of the accepted papers.

The paper titled 'Key establishment protocols for secure communication in clustered sensor networks' by A.S. Poornima and B.B. Amberker, proposes two cluster-based key establishment protocols. Hash-based protocol and polynomial-based protocol. The proposed protocols ensure dynamic establishment of a secret key between a node and its nearest cluster head (CH), as soon as new clusters are formed. It prevents a malicious node from becoming a CH or joins a cluster. Simulation results show considerable improvement over SecLeach.

Celimuge Wu, Satoshi Ohzahata and Toshihiko Kato in 'A reliable and flexible data gathering protocol for battery limited wireless sensor networks', consider a wireless sensor network (WSN) for clinical applications and propose FOPP, a fuzzy-logic-based one-phase pull protocol. The protocol jointly considers signal strength, route length and residual energy in the route selection, by using fuzzy logic.

A.W. Rohankar, Mrinal Kanti Naskar and Amitava Mukherjee in 'SWiFiNet: a real field WSN testbed', present a new designed testbed that completely eliminates expensive back channel infrastructure for reprogramming, communication data logging and setting of test experimental setup control parameters. The testbed, namely SWiFiNet, includes hardware and system software components. It permits time synchronised data recording, capturing, processing and repeatability of an experiment.

The paper titled 'Repellent voids for improving geographical routing efficiency in wireless sensor networks' by Mohamed Aissani, S. Bouznad, S.E. Allia and A. Hariza, proposes an approach to handling voids when using geographic routing in WSN. The authors propose two complementary mechanisms. The first one uses virtual forces generated by each closed void repelling the forwarded packets from its boundary, where the second one orients each packet that arrives on the network boundary inside the network, by using the shortest path leading to the sink.

Manish Kumar, Shekhar Verma and Neerav Agarwal in 'GMCA: a greedy multilevel clustering algorithm for data gathering in wireless sensor networks', tackle data gathering problem, which plays an important role in several applications of wireless sensor network (WSN). In an energy constrained WSN environment, the data gathering must be energy efficient to maximise the operational lifetime of the network. The authors propose

GMCA, a protocol that makes a dynamic backbone for data transfer to the base-station. The approach endeavours to simultaneously find the most energy efficient path for every message and balance energy consumption evenly in the network. Simulation results show that GMCA performs better than existing algorithms and significantly enhances the lifetime of a sensor network.

Finally, the paper titled 'Minimalist security and privacy schemes based on enhanced AES for integrated WISP sensor networks' by Jia Hao Kong, Li-Minn Ang and Kah Phooi Seng, presents a minimalist approach to securely encrypt, authenticate and exchange secret keys with a MISC processor based on the AES algorithm. The solution enables to use and utilise the available symmetric encryption from the sensor nodes and the RFID tags, without additional hardware or communication overhead.

We thank all the authors for their submissions. We would like to express our deep appreciation to the Editor-in-Chief, Professor Sudip Misra, for giving us the opportunity to publish this special issue, as well as the journal editorial staffs for their continuous support and guidelines during the process of this publication.

The guest editors are most grateful to the following reviewers who gave their time and effort to make this issue possible: Fei Gao, Shahid Raza, Chafika Benzaid, Enrica Zola, Congduc Pham, Houda Zeghilet, Sookyoung Lee, Haibing Guan, Jose M. Barcelo-Ordinas, Richard Holzer, Thomas Lagkas, Anne Kayem, Monica Aguilar, Michel Hurfin, Gregoire Danoy, Paul Bender, Mohamed Younis, Alexandre Guitton, Gregoire Danoy, Kalman Graffi, Waltenegus Dargie, Antoine B. Bagula, Ghalem Boudour and Monica Aguilar.