Guest Editorial
Wireless Ad Hoc and Sensor Networks

Recently, there is enormous advancing in wireless networking technology, especially in wireless ad hoc networking. Wireless ad hoc networking is an emerging technology in computer and communication networking. A wireless ad hoc network comprises mobile nodes in a network in absent of infrastructure. It covers a breadth of applications in multi-hop scenarios, such as in the locations of conferencing, hospital, battlefield, rescue, and even home. It differs from conventional network systems in many aspects. Additionally, its topology is self-organized, dynamic, and decentralized. Over the past decade, a particular one of ad hoc networking systems, wireless sensor network, was emerging. This kind of networking is involving a great amount of spatially distributed, energy-constrained, self-configuring, and location-aware nodes. Wireless sensor networks get a wide range of applications, including security and surveillance, control, actuation and maintenance of complex systems, and fine-grain monitoring on indoor or outdoor environments. Both kinds of wireless networking, ad hoc networks and sensor networks, are bringing us a variety of new technical challenges on research and development in theory or in practice.

This special issue aims at emerging technologies and applications, which can make feasible the exploitation of wireless ad hoc and sensor networks. The accepted papers in this special issue are classified into two major themes. The first one is in investigating the issues of coverage, deployment, object tracking, and routing for sensor networks. The second one is in exploring the problems of topology control, routing, resource management for wireless ad hoc networks.

At first, four accepted papers are focus on addressing the research issues for wireless sensor networks. The first paper is presented by *Chi-Fu Huang* and *Yu-Chee Tseng*. They survey a fundamental problem in wireless sensor networks, the coverage problem, which reflects how well an area is monitored or tracked by sensors. The second paper by *Sheng-Tzong Cheng* and *Chia-Liang Hsu* is to present a genetic optimal deployment for sensor networks. They propose an algorithm to link the sensor nodes into a cluster-based network. They use the way of genetic algorithm to find the location of cluster-heads and to balance loads among these clusters simultaneously for prolonging the lifetime of the wireless sensor network. The third paper by *Yu-Chi Chung*, *Chao-Chun Chen*, and *Chiang Lee* is to address the accuracy/energy issue of object tracking operation which is a fundamental operation of habitat monitoring applications. They propose a Trigger-based Object Tracking (TbOT) scheme to minimize the consumed energy for the habitat monitoring applications. *Tsung-Hung Lin*, *Yuh-Shyan Chen*, and *SingLing Lee* to the fourth paper propose a novel power-aware chessboard-based adaptive routing (PCAR) protocol to support immobility management in wireless sensor networks. The paramount design challenge in this work is to scale-down network energy consumption so as to prolong the entire network lifetime.

In what follows, we have the next seven accepted papers in discussing the research issues for mobile ad hoc networks. The first paper by *Yu Wang*, *Ivan Stojmenovic*, and *Xiang-Yang Li* addresses the problem of scatternet formation for single-hop Bluetooth based personal area and ad hoc networks, with minimal communication overhead. The second paper by *Chia-Ho Ou*, *Kuo-Feng Ssu*, and *Hewijin Christine Jiau* describes an approach to recovering the disconnected mobile ad hoc networks using assisting nodes. The assisting nodes can automatically move to appropriate locations for connecting network partitions. *Yen-Cheng Chen* and *Yi-Ping Lee* to the third paper are to present a quantitative approach for the estimation of link stability by using the relative standard deviation (RSD) of received signals strengths. A signal RSD based routing protocol, RSDBR, is thus proposed based on the link

stability estimations. The fourth paper, by *Yueh-Min Huang*, *Tzu-Chiang Chiang*, and *Ting-Wei Hou*, introduces the sequence and topology encoding for multicast protocol (STMP) for multicast routing in wireless ad hoc networks and generalizes the graph optimization problem of tree-based multicast protocol.

Kuei-Ping Shih, *Sheng-Shih Wang*, and *Sheng-Wei Lai*, to the fifth paper investigate an on-demand multicast protocol with ability of load-balanced complete-exchange multicasting (LCM), in which all multicast group members can exchange data among themselves. Based on the passive clustering technique, LCM adopts a cluster structure to provide multicasting and, thus, reduces a large amount of control packets flooding all over the network. The sixth paper, by *Mari Carmen Domingo* and *David Remondo*, analyzes how to provide end-to-end Quality of Service between nodes in a mobile ad hoc network and a fixed IP network that supports Differentiated Services. The ad hoc network incorporates the stateless wireless ad hoc networks (SWAN) model to support service differentiation. The seventh paper, by *Bin Xie* and *Anup Kumar*, presents a protocol for integrating mobile IP and enhanced DSDV (EDSDV) proposed to provide bi-directional Internet connectivity for ad hoc nodes.

Submissions obtained by a widely disseminated call for papers to this special issue went through carefully evaluation with at least two reviewers for each. Thus we are confident that this collection of accepted papers will contribute significantly to the development of our understanding of how technology for wireless ad hoc and sensor networks can become a significant part of networking technology.

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