Editorial

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Biographical notes: Qingfeng Huang received his DSc Degree in Computer Science from Washington University in St. Louis in 2003. He also holds AM and MS Degrees in Physics. He is a Research Scientist at the Palo Alto Research Center (PARC). He has published more than 30 papers in areas including software engineering, mobile computing, sensor networks, intelligent transportation systems, neuroscience, and quantum physics. His current research interests include algorithms and middleware for transportation networks and sensor actuator networks. He is a member of the IEEE Computer Society.

Ying Zhang is a member of the research staff at PARC. She received her PhD in Computer Science from the University of British Columbia in 1994. Her current research interests are in sensor/actuator networks and embedded control architectures. She has led software architecture development for Modular Reconfigurable Robots at PARC and has been working on Constraint-based Routing and Localisation on Sensor Networks. She is the Information Director of the ACM Transaction on Sensor Networks, and has served as TPC, guest editor, and NSF review panellist on sensor networks.

Miodrag Potkonjak received his PhD Degree in Electrical Engineering and Computer Science from University of California, Berkeley in 1991. He was with Computer and Communication Research Laboratories, NEC USA, Princeton, NJ from 1991 until 1995 when he joined the Computer Science Department at UCLA where he has been Professor since July 2000. He received the NSF CAREER award, OKAWA foundation award, UCLA TRW SEAS Excellence in Teaching Award and a number of best paper awards. He has published a book and more than 250 papers. He holds five patents. His research interests have been focused on statistical algorithmics, computational sensing, and system security.

Lionel M. Ni received his PhD Degree in Electrical and Computer Engineering from Purdue University, West Lafayette, Indiana, in 1980. He is Chair Professor and Head of Computer Science Department at Hong Kong University of Science and Technology. He was Professor of Computer Science and Engineering at Michigan State University from 1981 to 2003, where he received the Distinguished Faculty Award in 1994. His research interests include wireless sensor networks, parallel architectures, distributed systems, high-speed networks, and pervasive computing. A fellow of IEEE, He has chaired many professional conferences and has received a number of awards for authoring outstanding papers.

There has been a rapid growth in wireless sensor network research in the past few years. Many novel architectures, protocols, algorithms, and applications have been proposed, built and studied. The goal of this special issue is to keep one snapshot of the state-of-the-art research in this fast moving area.

We received 32 submissions from researchers in America, Asia, and Europe. Eight papers are recommended to the editor-in-chief for publication in this special issue after a rigorous peer-review process.

The accepted papers can be grouped into three main themes. The first set of papers deals with routing issues. The second set investigates the localisation problem. The third set addresses the time-synchronisation problem.

In 'Avoid 'void' in geographic routing for data aggregation in sensor networks', Shigang Chen, Guang-bin Fan and Jun-Hong Cui propose a new geographic routing algorithm which uses a 'distance upgrading' rule rather than the conventional planar face traversal strategy to deal with the 'void' problem in geometric networks.

In 'Using hierarchical location names for scalable routing and rendezvous in wireless sensor networks', Fang Bian, Xin Li, Ramesh Govindan and Scott Shenker argue that hierarchical location naming constitutes a better coordinate system option for wireless sensor networks than the conventional two- or three-dimensional coordinates when the node position of the nodes are manually configured. They propose and study a routing system based on hierarchical location name that constructs and maintains the routing tables using a variant of the distance-vector based routing protocol.

In 'A high-throughput energy-aware medium-access-control protocol for wireless sensor networks', Christopher Nguyen and Anup Kumar propose a new MAC protocol that aims to provide high throughput while reducing energy consumption, using a flexible and frequent scheduling of waking and sleeping cycles.

In 'Optimal distance geographic routing for energy efficient wireless sensor networks', Xin-Ming Huang and Jing Ma present a geographic routing protocol that uses distance information based power control strategy to reduce the communication energy consumption.

In 'MidHopRoute: a multiple path routing framework for load balancing with service differentiation in wireless sensor networks', Neha Jain, Dilip K. Madathil and Dharma P. Agrawal describe the benefit of identifying multiple paths between source-destination pairs based on their lengths and associated energy level and selecting appropriate paths according to application specific requirements of the data traffic. This results an improved application-aware load balancing.

In 'Sensor network localisation based on sorted RSSI quantisation', Xiaoli Li, Hongchi Shi and Yi Shang present a new localisation method based on a sorted RSSI quantisation algorithm. The algorithm can improve the range estimation accuracy when distance information is not available or too erroneous.

In 'Tradeoff between estimation performance and sensor usage in distributed localisation problems', Juan Liu and Qingfeng Huang explore the fundamental limit of collaborative sensing in the context of distributed collaborative localisation. Using information theoretic approach they show that localisation accuracy incurs fast diminishing returns with the expansion of collaborative localisation group size.

In 'Elapsed time on arrival: a simple and versatile primitive for canonical time synchronisation services', Branislav Kusý, Prabal Dutta, Philip Levis, Miklós Maróti, Ákos Lédeczi and David Culler present a simple time-stamping primitive called 'Elapsed time on arrival', and use it to construct a reactive time synchronisation protocol that can be used to correlate multiple event detection at one or more locations within microseconds and a proactive time-synch protocol to achieve network-wide synchronisation.

While addressing different issues, these selected papers provide only a very small view of the vast emerging scenes from the wireless sensor network research. The varying nature of the applications that senor networks are enabling and a variety of resource scarcity assumptions and reality have led to a new complex 'economy' in the context of wireless sensor network research. This special issue and other journals and conferences have covered some, but in no way, all topics in this field. We hope future issues of this journal will have more opportunity to further cover interesting work in this domain.

For us, it has been a pleasure working together on this special issue. We would like to thank all reviewers whose rigorous review effort is indispensable for the publication of this special issue. We would also like to thank all the scholars who submitted their work. Finally, we would also like to thank IJAHUC and the Inderscience Publishers for providing this platform/opportunity.

It is our hope that this special issue will be a valuable resource for the research community either in seeking further understanding of the field, studying prior arts, or evaluating solutions for specific applications.