2014

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Original Publication Citation

Li, S. C., Sun, H. J., Nallanathan, A., Xu, L., Zhao, S. S., & Sun, Q. D. (2014). Industrial wireless sensor networks. *International Journal of Distributed Sensor Networks, 2014*, 218050. doi:10.1155/2014/218050

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Hindawi Publishing Corporation
International Journal of Distributed Sensor Networks
Volume 2014, Article ID 218050, 2 pages
http://dx.doi.org/10.1155/2014/218050

Editorial

Industrial Wireless Sensor Networks

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Received 22 July 2014; Accepted 22 July 2014; Published 13 August 2014

Industrial wireless sensor networks (IWSNs) incorporate wireless sensor networks with intelligent industrial systems providing many advantages over existing industrial applications, such as wireless communication, low cost, rapid deployment, self-organization, intelligent controlling, and processing capability. With the proliferation of wireless sensor networks in industrial applications, IWSNs technologies promise to play a significant role in developing more reliable, efficient, stable, flexible, and application-centric industrial systems.

In the next few years, we will evidence very exciting era for researchers in the area of developing IWSNs technologies and applications. The development of IWSNs technologies is pivotal to the success of highly reliable and self-healing industrial systems. However, incorporating wireless sensor network technologies in the industrial systems presents many significant challenges, such as resource constraints, dynamic topologies and harsh environmental conditions, quality-of-service (QoS), data redundancy, packet errors and variable-link capacity, security, large-scale deployment, reliability, and scalability.

This special issue aims to gather researchers from different areas, such as wireless networks, industrial systems, security, and machine-to-machine (M2M) communication, showcasing edge-cutting research in IWSNs. For this special issue, we are pleased to introduce a collection of seventeen papers covering a range of topics: (1) design architectures, topology, protocols, and clustering algorithms for IWSNs which have specific industrial requirements; (2) security and reliability issues of IWSNs, including privacy preserving scheme and security standards in IWSNs; (3) IWSNs-based condition monitoring and applications in industrial areas, such as data fusion and intelligent control systems; (4) energy efficiency issue and scalability issue in IWSNs.

In the paper "*Time slots allocating and multicycle scheduling in IWSN for narrow process automation*," H. Xu et al. concentrated on analysing the deployments of IWSNs with harsh reliability, real time, and predictability issues.

The paper authored by J. Chen et al. "*Landmark-centric routing for wireless sensor networks in mobile delay tolerant environments*" analysed social-aware metric indicating the geographical location corresponding to a node in industrial environments.

In the paper "*A source aware scheduling algorithm for time-optimal convergecast*" by J. Zhao et al., a convergecast communication paradigm is proposed for industrial monitoring and controlling in IWSNs.

In the paper "*Privacy preserving inner product of vectors in cloud computing*" by G. Sheng et al, a privacy-preserving scheme for IWSNs in cloud environment has been proposed.

The paper "*Analysis and extension of safety mechanisms for standardized control networks in smart grid*" by J. Wu et al.

analysed the safety mechanisms for standardized control networks in smart grid.

The industrial applications require intelligent and low-cost IWSNs solutions to improve the efficiency, controllability, productivity, and safety.

In the paper *"Traffic information acquisition system with ultrasonic sensors in wireless sensor networks"* by Y. Jo et al., a traffic information acquisition system is proposed for industrial applications.

In the paper *"The process quality control method based on coupling machining sensor network"* by L. Zhao et al., a process quality control method is proposed for IWSNs applications.

The paper *"Development of a wireless sensor network for distributed measurement of total electric field under HVDC transmission lines"* by Y. Cui et al. develops an IWSN system to monitor the electric field under and high voltage direct current (HVDC) transmission lines.

The paper *"Stochastic modeling and analysis with energy optimization for wireless sensor networks"* by D. Xu and K. Wang proposes a stochastic model that is able to optimize the energy consumption.

The paper *"An energy efficient dynamic address encoding scheme for wireless sensor network"* by L. Zheng et al. proposes an energy efficient address-encoding scheme for applications in industrial environment.

The architectures, topology, routing, deployment, clustering, and algorithms of IWSNs may have specific industrial requirements.

In the paper *"Associated clustering strategy for wireless sensor network"* by Y. Sun et al., an associated clustering strategy for IWSNs is proposed.

The paper *"Adaptive compensation for time-slotted synchronization in wireless sensor network"* by T. Chang and Q. Wang develops an adaptive compensation method to achieve higher synchronization precision without exchanging message frequently.

The paper *"Online Bayesian data fusion in environment monitoring sensor networks"* by Y. Dingcheng et al. concentrates on a Bayesian model to reliably monitor physical phenomenon.

The paper *"Topology property based on network tomography for wireless mobile multihop communication network"* by D. Qin et al. studies the dynamic topology problems.

In the paper *"Frequency synchronization algorithms for MIMO-OFDM systems with periodic preambles"* by J. Sun et al., the MLE-MA and MLE-MAS are proposed to improve the robustness of MIMO-OFDM systems in IWSNs.

In the paper *"Distributed estimation fusion and control with packet losses for industrial wireless sensor and actuator networks"* by W. Ren et al, an interacting dual model (IDM) adaptive estimation algorithm is proposed to improve the reliability and fault tolerance of wireless communication in IWSNs.

The paper *"Game theory based energy-aware uplink resource allocation in OFDMA femtocell networks"* by J. Zhao et al. investigates energy efficient uplink power control and subchannel allocations in femtocell network.

Acknowledgments

The Guest Editors would like to sincerely appreciate all authors and anonymous reviewers for their great contributions. We also thank the journal editorial staff who has provided great support for this special issue.

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