

Editorial

Deploying Real-Life WSN Applications: Challenges, Solutions, and Future Directions

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The massive data from increasing numbers of Internet-enabled sensors and wireless sensor networks (WSNs), as well as humans as sensors, among other sources, is paving the way to an observable world in a nonprecedent scale. Great challenges lie ahead, not in the least for researchers worldwide, to collect and make sense of this information so that adaptable and smarter systems and applications can be made available. This International Journal of Distributed Sensor and Network special edition presents solutions for some of the challenges of design and implementation of WSN applications, involving quality of data, reliability, security, and limitation of resources regarding energy, storage, and processing of the collected data.

For WSN applications in a home environment, in which fixed and mobile sensors coexist, traditional WSN solutions do not meet requirements accordingly. One of our papers, “Architecture and routing protocols for smart wireless home sensor networks,” by Yang Xu et al., presents a solution of architecture, routing protocol, and recovery mechanism to integrate fixed sensors with mobile sensors in a wireless home sensor network. AC-powered sensors are used as backbone nodes for data retransmission while battery-powered sensors are used as leaves to transmit only data that are relevant to them. A mechanism based on prime numbers is used to indicate the route towards the destination. A path recovery algorithm is presented to handle node mobility and backbone node failures.

Data quality insurance and reliability are important requirements for WSN applications. However, due to the unreliable nature of wireless communication and resource constraints in sensor nodes, these requirements pose challenges for WSN researchers. Two of the papers address such issues. In “LiReTa: A lightweight reliable transmission scheme for wireless sensor networks using cross-layer information,” the authors, Gawon Lee, and Eui-Nam Huh, introduce a solution to reliability based on overhearing data transfer protocol, which uses “implicit acknowledgement” in a cross-layer design. In another paper, “Node classification based on functionality in energy efficient and reliable wireless sensor networks,” by Ning Sun et al., a solution using different MAC and network strategies is presented to ensure reliability in data dissemination.

With the widespread deployment of WSN in different domains of application, from home to defense, WSN applications can be targets to different attacks. As an open transmission media, a sensor network can be subject to radio jamming attacks that can be challenging to defend, provoking corrupted packets and low network throughput. Authors Yanmin Zhu et al., present an adaptive solution to jamming signals attacks in the paper “Optimal adaptive anti-jamming in wireless sensor networks” by combining powerful existent techniques with a novel mechanism, based on a Markov decision process, which computes the best antijamming strategy under jamming conditions varying over time.

Given the sensor nodes limited resources for storage and processing, the integration of cloud computing and WSN can provide a powerful solution. In the paper entitled “*A survey on sensor-cloud: architecture, applications, and approaches*,” by Atif M. AlAmri et al., the authors present a comprehensive survey of the recent works on sensor-cloud infrastructure including an overview of the sensor-cloud platform, its definition, architecture, and applications. The manuscript also highlights the research challenges and future research directions in this area.

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