Preface

A WSN may be described as a network of nodes that cooperatively sense and control the environment enabling interaction between persons or computers and the surrounding environment. Recent developments in networking and material science and nanotechnologies are the driving force for the overall development of large-scale wireless sensor networks (WSNs). In addition, these technologies have merged together to enable a new generation of WSNs that differ significantly from traditional wireless networks, which was implemented 5–10 years ago. Like any other advanced technologies, the origin of WSNs can be traced back to military applications. The first wireless network, which has a close resemblance to a recently used WSN, is the Sound Surveillance System (SOSUS) developed by the United States Military in the 1950s. This network used submerged acoustic sensors hydrophones, distributed in the Atlantic and Pacific oceans. The same sensing technology is still existing today and serving for the peaceful applications. Afterward during 1980s, the United States Defense Advanced Research Projects Agency (DARPA) started the Distributed Sensor Network (DSN) program to formally explore the challenges in implementing distributed/wireless sensor networks. Later on, scientific research communities as well as academia join hands to develop the WSN technology. Subsequently, government and universities began using WSNs for various applications, such as air quality monitoring, forest fire detection, natural disaster prevention, weather stations and structural monitoring, power distribution, waste-water treatment, and specialized factory automation, which were basically heavy industrial applications.

Present day state-of-the-art WSN has less deployment and maintenance costs, more rugged, and last longer, and they are now used for various applications at our homes, work places, bringing new sources of information, control, and convenience to our personal and professional lives. Efficient design and implementation of wireless sensor networks has become a hot area of research, due to the vast potential of sensor networks to enable applications that connect the physical world to the virtual world. This volume covers the recent developments in the area of Wireless Sensor and Ad-hoc Network. Potential applications for such large-scale

WSN exist in a various domains, such as health monitoring, home security and surveillance, and personal environmental monitoring, such as temperature and humidity.

In future, micro-fabrication technology shall bring down the cost of sensor nodes resulting in the pervasive use of wireless sensor networks with a large number of nodes. For the smooth deployment of the future WSN, researchers and designers are now engaged in solving the complex trade-offs among many application variables including deployment costs, hardware and software, system reliability, security, and performance. Wireless embedded system designers must also consider these trade-offs and make alternative decisions, such as transducer and battery technology choices, frequency of wireless operation, output power and networking protocols. The complexity of WSN design not only represents one of the most significant barriers to the widespread adoption of WSNs, but also provides an opportunity for hardware and software technology suppliers to add value. Another trade-off is also use of well established, standardized mix of hardware/software solutions for different WSN applications.

Srikanta Patnaik
Xiaolong Li
Yeon-Mo Yang

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