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Green Wireless Sensor Networks

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Abstract: Green wireless sensor networks may be regarded as looking at WSN from the perspective of green computing. They play a major role in today's green applications, which aim at avoiding the waste at all levels of the society. They serve as a fundamental infrastructure for the Internet of things systems. This paper briefly presents an introduction on green wireless sensor networks.

Key words: wireless sensor networks, green wireless sensor networks, green computing,

Introduction

Today, wireless and mobile communications have become very popular with consumers
Among wireless networks, the fastest growing sector has been wireless sensor networks (WSN). They are increasingly been introduced into our daily lives [1].

The development of WSNs was inspired by military applications, notably surveillance in battlefield. A wireless sensor network consists of a large number of sensor nodes which are deployed and networked to monitor or survey targeted area. They are used in monitoring physical and environmental conditions.

The concept "green" has been used to solve problems of global energy shortage, abnormal weather, and environmental pollution. WSN is considered green due to decreased energy usage by the overall network as well as its actual application. A major concern in green wireless sensor networks (GWSN) is reducing unnecessary energy consumption.

Wireless sensor networks

A wireless sensor network (WSN) consists of a large number of autonomous sensor nodes deployed over a geographical region. The wireless sensor nodes are compact, light-weighted, and battery-powered devices that can be used in virtually any environment [2]. The rapid advancements in integrated circuit technology led to the development of low cost, tiny sensor nodes with characteristics including sensing, computational, processing, data storage, and wireless communication capabilities. The nodes are capable of wirelessly communicating with each other through the Internet. Each sensor is equipped to detect physical phenomena such as light, heat, and pressure. The usage of limited battery power in sensors is a major constraint in WSNs.

Such a sensor-based network is suitable for periodic environmental data gathering and predictive analysis. WSNs are being used in various applications such as battlefield, building inspection, detecting ambient conditions, agriculture, environmental monitoring of air-water pollution, greenhouse, health monitoring, structural monitoring, and disaster management [3]. They can serve as predictors of future events which threaten environments. They can effectively be used in healthcare for health monitoring, smart nursing homes, in-home assistance, telemedicine, and wireless body area networks [4]. Applications of WSNs are growing exponentially as the nodes are becoming cheaper and more versatile.

Through WSNs, we can connect the physical word and the cyber space, which enables smart applications. The networks are helpless against several security dangers that can influence their legitimate working. WSN power consumption is an important issue because of the use of batteries and their fast growth.

Wireless sensing in a densely populated urban communities, such as campus, business, and other public spaces in our cities and towns, can be especially valuable for monitoring the physical environment. WSNs are used to monitor many aspects of a city in real time. For example, massive WSNs are deployed to realize smart city. A smart city is an effective means of handling city problems, in which the massive infrastructure components and services including transportation, energy, building, healthcare, education, and utilities can be effectively combined. Smart cities include a variety of smart applications such as smart building/house, smart energy, smart transportation, smart farms, and smart health [5].

Green WSN

One of the major challenges WSNs face today is low power consumption. Cognitive WSNs framework is a key issue in green communications because of many protocols, strategies, and optimization algorithms could be tested. The green wireless sensor network (GWSN) is an emerging concept in which the lifetime and throughput performance of the network is maximized while minimizing the carbon footprints. This energy-frugal network serves in a wide range of green applications. They have been applied in many fields including environmental engineering, healthcare, industry, military applications, smart home, and green buildings. They are used in intrusion detection. and energy harvesting, storage, and usage.

Conclusion

A WSN is a network of nodes that cooperatively sense and control the environment. It belongs to the general family of sensor networks that employ distributed sensors to collect information on entities of interest. The network is considered green due to decreased energy usage. The green wireless sensor network (GWSN) serves in a wide range of green applications.

REFERENCES

[1] A. Araujo et al., "Cognitive wireless sensor networks framework for green communications design," *The Second International Conference on Advances in Cognitive Radio*, 2012, pp. 34-40.
[2] M. N. O. Sadiku, S. M. Musa, and O. D. Momoh, "Wireless sensor networks: Opportunities and challenges" *Journal of Engineering Research and Applications*, vol. 4, no. 1, Jan. 2014, pp. 41-43.
[3] Aanchal et al., "Green computing for wireless sensor networks: Optimization and Huffman coding approach," *Peer-to-Peer Network Applications*, 2016.
[4] M. N. O. Sadiku, K. G. Eze, and S. M. Musa, "Wireless sensor networks for Healthcare," *Journal of Scientific and Engineering Research*, vol. 5, no. 7, 2018, pp. 210-213.
[5] W. Lu et al., "Collaborative energy and information transfer in green wireless sensor networks for smart cities," *IEEE Transactions on Industrial Informatics*, vol. 14, no. 4, April 2018, pp. 1585- 1593.

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