Survey Paper on Wireless Sensor Network

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ABSTRACT

Wireless sensor network provide a new paradigm for sensing and sending information. Wireless sensor networks are used in monitoring and control applications. Current WSN typically communicate directly with a centralized controller or a satellite, thus communication between the sensor and controller is based on a single hoop. An on-going area of research is, where WSN nodes or terminals that communicate with each other forming a multi-hop network. Such WSNs could change their topology dynamically when connectivity among the nodes varies with the time due to node mobility. The wireless sensor networks are the type of sensor networks which is used to sense the environmental conditions like temperature, pressure etc.

Key Words: *Clustering, Energy Efficiency, Protocol, Wireless Sensor Network.*

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1. INTRODUCTION

Wireless sensor network is a wireless network consisting of spatially distributed autonomous devices using sensors to monitor physical or environmental conditions. A WSN system incorporates a gateway that provides wireless connectivity back to the wired world and distributed nodes. The wireless protocol you select depends on your applications requirements. Some of the available standards include 2.4GHz radios based on either IEEE 802.15.4 or IEEE 802.11(Wi-Fi) standards or proprietary radios, which are usually 900 MHz. A WSN is a collection of sensors which communicate over the wireless channel. Wireless sensor network is an emerging field for research in today's world. Wireless sensor network have vast potential for usage of sensor networks in different areas like military are, disaster management, sensing environment conditions such as temperature, humidity etc. Wireless sensor network is a collection of huge number of micro sensor nodes, which are generally deployed in such an environment where unattended operation is required by the applications. The service provided by WSNs is based on collaboration among small energy-constrained sensor nodes. The large deployment of WSNs and the need for energy efficient strategy necessitate efficient organization of the network topology for the purpose of balancing the load and prolonging the network lifetime.

2. BACKGROUD AND CURRENT RESEARCH

Wireless sensor networking is envisioned as an economically viable paradigm and a promising technology because of its ability to provide a variety of services, such as intrusion detection, weather monitoring, security, tactical surveillance, and disaster management. Research on WSNs have been focused on many research efforts and emerged as an important new area in wireless technology. There are large numbers of applications of wireless sensor network due to their various properties. There are a lot of benefits of these type of networks which are the reason of their increasing demands. Wireless sensor networks consist of sensor nodes which are small in size, cheap and also have self controlled battery powered system [3].

Sarab F. Al Rubeaai, et.al (2015) proposed in this paper, [5], a novel 3D real-time geographical routing protocol (3DRTGP) for WSNs. The numbers of forwarding nodes within the network are controlled by this protocol. This is done by limiting the forwarding to a unique packet forwarding region (PFR). Under the different network densities and traffic load conditions, the performance of this protocol is evaluated by performing certain simulations. The needs of real-time applications are fulfilled with the help of the network tuning parameters that are provided by the results. Within the 3D deployments, the Void Node Problem (VNP) is solved by the 3DRTGP heuristically. Even when there is no network partitioning, the 3DRTGP helps is resolving the VNP. With respect to the end-t-end delay and miss ration parameters, this protocol has shown better performance than the other routing protocols.

Adnan Ahmed, et.al (2015) proposed in this paper [7], a Trust and Energy-aware Routing Protocol (TERP). For the purpose of detection and isolation of malicious nodes, this distributed trust model is used. A composite routing function is included in TERP which provides trust, residual energy as well as hop counts of neighboring nodes which will further help in taking the routing decisions. The energy consumption amongst the trusted nodes is balanced when the routing data utilizes the shorter paths with the help of this routing strategy. According to the simulation results achieved there is a reduction in the energy consumption, enhancement in the throughput as well as lifetime of the network when the TERP is used as compared to other protocols.

Lein Harn, et.al (2016) proposed in this paper [10], a novel design of secure end-to-end data communication. A newly designed group key pre-distribution method is proposed here which provides a unique group key which is also known as the path key This key is used for protecting the transmitted data which is present in the complete routing path. There are many pairwise shared keys used in repeated form for the purpose of encryption and decryption in the network. To avoid repetitive use, the unique end-to-end path key is proposed here which protects the data which is transmitted across the network. The sensors can be authenticated using this protocol for the purpose of establishing path as well as the path key. Through this protocol, the time which is needed to process data through intermediate nodes is reduced, which is an important advantage here.

3. DIFFERENCE BETWEEN WSNs AND TRADITIONAL NETWORKS

The WSNs are networks of computing devices; they are considerably different from traditional networks. The first difference of WSNs compared to traditional data networks is that they have severe energy, computation, storage, and bandwidth constraints. The second difference of WSNs compared to traditional data networks is their overall usage scenario and the implications which it brings to the traffic and interaction with the users. Typically, in traditional network, users are connected to a node (group of nodes) and require a service from another node.

Another structural characteristic of WSNs is the choice of communication mode, i.e., single hop versus multi-hop. For example, the network could be designed so that the nodes in each cluster either use single hopping, or multi-hopping to reach the CH. The optimum choice of communication depends on the radio energy modal. The network may consist of a single type of nodes (homogenous network). Since cheap sensor nodes are expected to be manufactured in bulk quantities, node reliability is another important factor that should be taken into account in dimensioning the networks.

4. WSN ARCHITECTURE

A wireless sensor network is composed of tens to thousands of sensor nodes which are distributed in wide area. Each sensor node is made up of four basic components such as a sensing unit, a processing unit, a transceiver unit and a power unit. A sensor node may also have application dependent additional option components such as a location finding system, a power generator and a mobilizer. Sensing units are usually composed of two subunits: sensors and analog to digital convertor (ADCs). The analog signals produced by the sensor based on the observed phenomenon are converted to digital signals by the ADC, and then fed into the processing unit. Te processing unit, which is generally associated with a small storage unit, manages the procedures that make the sensor node collaborate with the other nodes to carry out the assigned sensing tasks. A transceiver unit connects the node to the network. One of the most important components of a sensor node is the power unit. Power units may be supported by a power scavenging unit such as solar cells. There are also other subunits, environment, perform simple computations, and communicate among its peer or directly to an external BS.

5. APPLICATIONS OF WSN

5.1 AREA MONITORING

Area monitoring is a common application of WSNs. In area monitoring, the WSN is deployed over a region where some phenomenon is to be monitored. A military example is the use of sensors detects enemy intrusion; a civilian example is the geo-fencing of gas or oil pipelines.

5.2 HEALTH CARE MONITORING

The sensor networks for medical applications can be of several types: implanted, wearable, and environment-embedded. The implanted medical devices are those that are inserted inside human body. Wearable devices are used on the body surface of a human or just at close proximity of the user.

5.3 ENVIRONMENTAL/ EARTH SENSING

There are many applications in monitoring environmental parameters, examples of which are given below. They share the extra challenges of harsh environments and reduced power supply.

- Air pollution monitoring
- Forest fire detection
- Landslide detection

- Water quality monitoring
- Natural disaster prevention

5.4 INDUSTRIAL MONITORING

There are many applications of WSN in industrial monitoring, examples of which are given below.

- Machine health monitoring
- Data center monitoring
- Data logging
- Water/ waste water monitoring
- Structural health monitoring
- Wine production

6. CONCLUSION

In this paper, we discussed about the wireless sensor network. In this paper, it is been concluded that various techniques which are proposed in the recent times to reduce the energy consumption of wireless sensor network are been reviewed and discussed. Localization of nodes is a very important and a challenging task. Localization is necessary for many applications. This paper presented a survey of various localization schemes used in underwater seas, oceans etc.

REFERENCES

[1] L. Liu, X. Zhang, and H. Ma, "Optimal node selection for target localization in wireless camera sensor networks," 2010, IEEE Trans. VehTechnol., vol. 59, no. 7, pp. 3562–3576..

[2] Y. Weng, W. Xiao, and L. Xie, "Sensor selection for parameterized random field estimation in wireless sensor networks," 2011, J. Control Theory Appl., vol. 9, pp. 44–50.

[3] G. Tolle, J. Polastre, R. Szewczyk, D. Culler, N. Turner, K. Tu, S.Burgess, T. Dawson, P. Buonadonna, D. Gay, andW. Hong, "A microscope in the redwoods," 2005, 3rd ACM SenSys, New York, NY, USA, pp. 51–63.

[4] Abdulsalam, Hanady M., Bader A. Ali"W-leach based dynamic adaptive data aggregation algorithm for wireless sensor networks," International Journal of Distributed Sensor Networks 2013

[5] Sarab F. Al Rubeaai, Mehmmood A. Abd, Brajendra K. Singh, Kemal E. Tepe," 3D Real-Time Routing Protocol with Tunable Parameters for Wireless Sensor Networks", 2015, IEEE Sensors Journal.

[6] AmitSharma, Dr.S. N. Panda, Dr.Ashu Gupta "IMPLEMENTATION OF ENERGY EFFICIENT AND SECURED PROTOCOL FOR DEPLOYMENT IN WIRELESS SENSOR NETWORKS," International Journal of Enterprise Computing and Business SystemsISSN (Online) : 2230-8849 ,Volume 4 Issue 2 July 2014.

[7] Adnan Ahmed, Kamalrulnizam Abu Bakar, Muhammad Ibrahim Channa, Khalid Haseeb andAbdul Waheed Khan," TERP: A Trust and Energy Aware Routing Protocol for Wireless Sensor Network", 2015, IEEE.

[8] Gurbinder Singh Brar, Shalli Rani, Vinay Chopra, Rahul Malhotra, Houbing Song, Syed Hassan Ahmed," Energy Efficient Direction Based PDORP Routing Protocol For WSN", 2016, IEEE.

[9] Guangjie Han, Jinfang Jiang, Na Bao, Liangtian Wan, and Mohsen Guizani," Routing Protocols for Underwater Wireless Sensor Networks", 2015, IEEE.

[10] LeinHarn, Ching-Fang Hsu, OuRuan, and Mao-Yuan Zhang," Novel Design of Secure End-to-End Routing Protocol in Wireless Sensor Networks", 2016, IEEE SENSORS JOURNAL, Vol. 16, No. 6.

[11] JingJing Yan, MengChu Zhou, and ZhiJun Ding," Recent Advances in Energy-efficient Routing Protocols for Wireless Sensor Networks: A Review", 2016, IEEE.

[12] Salim EL KHEDIRI, Nejah NASRI, Anne WEI ,Abdennaceur KACHOURI "A New Approach for Clustering in Wireless Sensors Networks Based on LEACH," International Workshop on Wireless Networks and Energy Saving Techniques (WNTEST), Procedia Computer Science 32 (2014) 1180 – 1185.