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Energy Optimization in Wireless Sensor Networks Applications: A Survey

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Abstract: A Wireless Sensor Networks (WSNs) are equipped with large number of sensor nodes that consists of several sensing elements distributed to achieve specific objective of environment. Sensor nodes can be used to solve many issues like air pollution, water pollution, wind speed and irrigation of agriculture. Energy is the most important factor in WSNs to enhance the sensor lifetime as well as the network lifetime due to all sensors is battery powered. Future research involves designs the routing protocols to utilize less energy during communication to extending the lifetime of network. In most of the applications, a replacement or rechargeable of energy is more expensive. An energy harvesting wireless sensor networks make use of nodes that are able to get energy from the environment. In this paper, we discuss and review wireless sensor network applications and energy optimization to minimize the e-waste to enrich for environmental.

Keywords: Energy, E-Waste, WSN, Energy Harvesting

I. INTRODUCTION

Wireless sensor networks can be deployed in homogenous or heterogeneous networks in the field to achieve the specific goal. Sensors are small devices which monitor various conditions like temperature level, humidity and pressure etc. and later convert it into electrical signal[1]. Sensor nodes are used to sense environmental data and collect information at a central place. Sensors have been scattered into geographical area and also sensors are spitted into small clusters. Each cluster has one cluster head (CH) to monitor and control the sensor nodes. There is no specific topology in wireless sensor networks to equip the clusters in the network. Each sensor nodes have sensing part, processing part, communication part and battery for power management to process the data. All clusters are directly communicated to sink node to aggregate the sensed data at specific interval time.

II. APPLICATIONS OF WIRELESS SENSOR NETWORK

2.1 Environment

Environment monitoring is an important task of control and protection, providing real-time system and control communication with the real world. Climate change is increasingly recognized as a major challenge, and it is widely accepted that the greenhouse gas (GHG) emissions caused by humans are having a negative impact on the environment. Weather conditions are highly reviewed through wireless sensor network to monitor surroundings of environment and its development is for human being daily life routine[2]. Habitat monitoring is one of the most essential things in environmental monitoring. Habitat means a place in which an animal or plant naturally grows or dead. Therefore, habitat monitoring is an important to make sure to prevent any ecological disturbance for animals and plants in forest.

2.2 Agriculture

In traditional agricultural related monitoring system equipped with direct power and transmits data by cable. Therefore it is very difficult to gather the real-time information on environmental monitoring due to laying cable lines, high investment cost and man-made destruction[3]. Therefore wireless sensor network based monitoring system is used to monitor temperature and humidity of field and crops of agriculture environment.

2.3 Health Care

WSN plays major role in health care sector to monitor patient's vital parameters such as blood pressure, heart rate, body temperature, and ECG. Telemedicine using WSN has recently become a popular method in healthcare division. It refers to the provision of healthcare services and education over a distance using information and communication technologies[4]. It allows to doctor for remote medical evaluations and carefulness of patient. The use of telemedicine minimizes the overall cost of healthcare in real word.

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2.4 Industry
WSN is dedicated for industrial process and service improvement important part of all the industries. In this way, with the use of temperature and humidity information it is possible to implement the automated control system that consume irrigation water in efficient manner.

2.5 Smart Home
Wireless sensor networks are great role in smart home applications like as automatic door open, air-conditions operation and surveillance security. Also the residential building sector usually consumes more energy than the commercial sector[5]. Most of the energy demands in the residential sector are related hot water preparation and lights.

Fig1. Applications of WSN

III. IMPORTANT PARAMETERS SENSOR NETWORK OF WIRELESS

Wireless Sensor Networks (WSNs) consumes higher energy during data transmission time in network. The high energy consumption is a crucial and vital role in the network and also affects the lifetime of network.

3.1 Network delay: Network delay is to measure the average end-to-end delay of data packet transmission.

3.2 Network throughput: Network throughput is to measure number of packets per second received at the destination from the source node.

3.3 Success rate: Success rate is to measures total number of packets received in destination out of total number of packets sent from source.

3.4 Latency: Latency is the measurement of time that is round trip between server and browser. Latency occurs depends upon the router, transmission medium and propagation.

3.5 Network lifetime: Network lifetime is defined as the maximum amount of time between First Node Death (FND) and Last Node Death (LND)[6].

IV. RESEARCH CHALLENGES IN WSN

In wireless sensor networks, routing plays a major role in reducing energy consumption and also consequently, increasing the lifetime of the network. Therefore, the design of routing protocols in WSN is challenging because it involves limitations for the efficiency of the network energy[7]. Challenges in WSN include higher bandwidth demand, high energy consumption, quality of service (QoS) provisioning, data processing and compressing techniques and cross-layer design. Energy harvesting in WSNs is the vital role to receive a lot of attention by various stakeholders involved in their design and implementation given the strong potential of energy harvesting techniques in meeting the energy demands of future WSN deployments[8]. The limited availability of energy on sensor nodes is one of the most critical problems in networks[9].

V. CONCLUSION

We conclude in this paper WSN electric power requirements for the dismounted required for WSN on future applications. Application-specific optimal parameters setting is also need for maximize the WSN battery life because battery recharging or replacement is low level possible in WSN. In order to further distribute power consumption we have considered as per applications based data transmission without packet loss to improve success rate. . This study was achieved by means of a conversion efficiency optimization and finally by we need on some improved algorithms for optimize the Wireless sensor network energy and also improve the quality of service (QoS).

REFERENCES

[1] M. M. Warrier and A. Kumar, "An energy efficient approach for routing in wireless sensor networks," *Procedia Technol.*, vol. 25, no. Raerest, pp. 520–527, 2016, doi: 10.1016/j.protcy.2016.08.140.
[2] M. F. Othman and K. Shazali, "Wireless sensor network applications: A study in environment monitoring system," *Procedia Eng.*, vol. 41, pp. 1204–1210, 2012, doi: 10.1016/j.proeng.2012.07.302.
[3] Y. Zhu, J. Song, and F. Dong, "Applications of Wireless Sensor Network in the agriculture environment monitoring," *Procedia Eng.*, vol. 16, pp. 608–614, 2011, doi: 10.1016/j.proeng.2011.08.1131.
[4] M. N. O. Sadiku, K. G. Eze, S. M. Musa, R. G. Perry, P. V. A, and P. View, "Wireless Sensor Networks for Healthcare Available online www.jsaer.com Journal of Scientific and Engineering Research , 2018 , 5 (7): 210-213 Wireless Sensor Networks for Healthcare," no. September, 2018.
[5] S. Nižetić, N. Djilali, A. Papadopoulos, and J. J. P. C. Rodrigues, "Smart technologies for promotion of energy efficiency, utilization of sustainable resources and waste management," *J. Clean. Prod.*, vol. 231, pp. 565–591, 2019, doi: 10.1016/j.jclepro.2019.04.397.
[6] M. Elshrkawey, S. M. Elsherif, and M. E. Wahed, "An Enhancement Approach for Reducing the Energy Consumption in Wireless Sensor Networks," *J. King Saud Univ. - Comput. Inf. Sci.*, vol. 30, no. 2, pp. 259–267, 2018, doi: 10.1016/j.jksuci.2017.04.002.
[7] F. Fanian and M. Kuchaki Rafsanjani, "Cluster-based routing protocols in wireless sensor networks: A survey based on methodology," *J. Netw. Comput. Appl.*, vol. 142, no. February, pp. 111–142, 2019, doi: 10.1016/j.jnca.2019.04.021.
[8] F. K. Shaikh and S. Zeadally, "Energy harvesting in wireless sensor networks: A comprehensive review," *Renew. Sustain. Energy Rev.*, vol. 55, pp. 1041–1054, 2016, doi: 10.1016/j.rser.2015.11.010.
[9] A. Alfieri, A. Bianco, P. Brandimarte, and C. F. Chiasserini, "Maximizing system lifetime in wireless sensor networks," *Eur. J. Oper. Res.*, vol. 181, no. 1, pp. 390–402, 2007, doi: 10.1016/j.ejor.2006.05.037.