



Reliable and Efficient Data Acquisition in Wireless Sensor Network

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ABSTRACT

The sensors in the WSN sense the surrounding, collect the data and transfer the data to the sink node. It has been observed that the sensor nodes are deactivated or damaged when exposed to certain radiations or due to energy problems. This damage leads to the temporary isolation of the nodes from the network which results in the formation of the holes. These holes are dynamic in nature and can grow and shrink depending upon the factors causing the damage to the sensor nodes. So a solution has been presented in the base paper where the dual mode i.e. Radio frequency and the Acoustic mode are considered so that the data can be transferred easily. Based on this a survey has been done where several factors are studied so that the performance of the system can be increased.

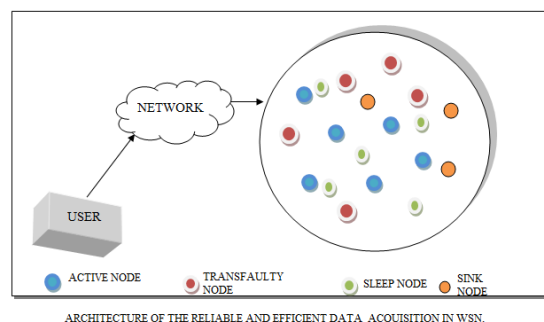
KEYWORDS: Wireless Sensor Network, Sensor deployment, Energy hole problem.

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I. INTRODUCTION

WSN is the collection of several nodes which transfer the data. There are several factors which affect the performance of the sensor nodes and may even damage them. As long as there is no damage to the sensor nodes, it continues to work in the radio frequency mode, when there occurs the node failure, the acoustic mode is activated. The data is then extracted and transferred further. The elimination of the faulty nodes from the system cannot be the solution since all the resources and the services associated with the sensor node can be used again when they are recovered. It also helps in increasing the lifetime of a network. Thus the working of the model in dual mode proves to be better, since we switch to the other sleeping nodes and transfer the data through them. Also the range of the node plays an equally important role while the data is transferred from one node to the other. The motivating factors related to this are increasing the lifetime of the Wireless sensor network using fault tolerance and the fault node detection, also active cooperative communication has to be there amongst the nodes so that the change in the

topology can be reflected immediately and data can be sent with minimum delay. The architecture diagram of the system shown below helps us to understand the system.



II. LITERATURE SURVEY

The paper presented by the Pushpendu Kar and Sudip Misra Jan 2016 provides us with the details of how the dual mode i.e. radio frequency and the acoustic mode can be implemented for the effective and efficient data transfer. Also emphasized on the data extraction process. Due to the proposed system the data can be sent more efficiently [1]. In the paper presented by Kealan McCusker, Noel E. O'Connor May/June 2011 a solution for

distributing symmetric keys and network access control in a WSN using IBC is proposed. The proposed scheme was evaluated against well-known attacks on a WSN and found to perform well. Several groups implement for Tate pairing in hardware but are targeting the latency metric and also Field Programmable Gate Arrays (FPGAs) rather than energy and an ASIC, therefore these contributions lack over the suggested theory which is several magnitudes higher than what is achieved by implementing the pairing in hardware, and too high for the limited energy available to a node. Work is needed in order to implement other components of the scheme such as the elliptic curve point multiplication and exponentiation in the field [2].

Cesare Alippi, Giuseppe Anastasi, Mario Di Francesco, and Manuel Roveri Feb 2011. In this paper authors proposed an *adaptive sampling algorithm* that estimates online the optimal sampling frequencies for sensors. This approach, which requires the design of adaptive measurement systems, minimizes the energy consumption of the sensors and, incidentally, that of the radio while maintaining a very high accuracy of collected data. It can perform similar to a fixed-rate scheme where the sampling frequency is known in advance. This approach results in a corresponding energy saving of both the sensor and the radio. Conclusion strongly depends on the specific sensor, whose power consumption is significantly larger than that of the radio [3].

Levente Buttyán, László Czap, and István Vajda Nov/Dec 2011 In a pollution attack, the adversary maliciously alters some of the stored encoded packets, which results in the incorrect decoding of a large part of the original data upon retrieval. Authors proposed algorithms to detect and recover from such attacks. This paper can be applied in any coding-based distributed storage systems, be it in the domain of P2P file distribution or in wireless sensor networks. In particular, this approach does not require the storage nodes to perform additional coding on or to add additional information to the encoded packets. Proposed algorithm is effective and extremely efficient both in terms of communication and computational overhead. It does not scale up to very large systems in terms of computational complexity [4].

Ing-Ray Chen, Anh Phan Speer, and Mohamed Eltoweissy March/April 2011 Authors developed adaptive fault-tolerant quality of service (QoS) control algorithms based on hop-by-hop data delivery utilizing “source” and

“path” redundancy, with the goal to satisfy application QoS requirements while prolonging the lifetime of the sensor system. Algorithm which incorporates path and source redundancy mechanisms to satisfy query QoS requirements while maximizing the lifetime of query-based sensor networks. Future work: provide a more detailed analysis of the effect of network dynamics on MTTF, such as more energy may be consumed by some SNs over others or some SNs may fail earlier than others [5].

Masanori Miyazawa and Michiaki Hayashi Rolf Stadler 2nd Jan, 2015 The paper proposes a distributed management function, called virtualized network management function (vNMF), to detect failures related to virtualized services. vNMF detects the failures by monitoring physical-layer statistics that are processed with a self-organizing map algorithm. Memory leaks and network congestion failures can be successfully detected and that and the accuracy of failure detection can be significantly improved compared to common k-means clustering. The proposed vNMF is expected to facilitate scalable network management toward more complex network virtualization environments in the future work [6].

Steven S. McClure, L. D. Edmonds, R. Mihailovich, A. H. Johnston, P. Alonzo, J. DeNatale, Member, IEEE, J. Lehman, and C. Yui Dec 2002 A mechanism for dielectric charge trapping and its effect on the electrostatic force is proposed. Of notable significance is the susceptibility of GaAS MEMS devices to radiation effects, as found in this work. Such effects, if present, may be eliminated with proper design techniques, as demonstrated in the alternate RSC switch configuration. It is strongly recommended that devices of this type be thoroughly characterized for radiation effects prior to use in systems with a space or nuclear radiation environments. [7].

Erfan Soltanmohammadi, Mahdi Orooji, Mort Naraghi-Pour Jan 2013 The problem of decentralized detection in wireless sensor networks in the presence of one or more classes of misbehaving nodes. Binary hypothesis testing is considered where the honest nodes transmit their binary decisions to the fusion center (FC), while the misbehaving nodes transmit fictitious messages the problem of decentralized detection in wireless sensor networks in the presence of one or more classes of misbehaving nodes. Binary hypothesis testing is considered where the honest nodes transmit their binary decisions to the fusion center

(FC), while the misbehaving nodes transmit fictitious messages[8].

Tapas Kanungo, David M. Mount, Nathan S. Netanyahu, Christine D. Piatko, Ruth Silverman, and Angela Y. Wu July 2002 Proposed in 2 ways: First, authors present a data-sensitive analysis of the algorithm's running time, which shows that the algorithm runs faster as the separation between clusters increases. Second, a number of empirical studies both on synthetically generated data and on real data sets from applications in colour quantization, data compression, and image segmentation. A simple and efficient implementation of Lloyd's k-means clustering algorithm, which we call the filtering algorithm. The advantage of this algorithm is it requires a kd-tree as the only major data structure. This algorithm is quite complex and does not provide significantly faster running time in practice [9].

Vibha Paradkar, Gajendra Singh Chandel, Kailash Patidar, 2015 proposes a new routing algorithm (Master/Slave) for discovery and recovery of the routing path efficiently. The primary path, secondary path and the segmentation process helps to navigate the data from the non-faulty nodes [10]. Also multipath routing helps transfer data simultaneously thus by reducing delay and congestion in the network [12].

Saad Ahmad Khan, Ladislau Bölöni, Damla Turgut, 2015 the paper proposes a theory where the bridge nodes are protected by giving some of the responsibilities of the sink nodes to the other nodes. It prevents the apparition of the additional bridge nodes. The disadvantage is that the algorithm sacrifices the length of some routes in order to distribute the routes away from the critical area [11].

Amit Sharma, Kshitij Shinghal, Neelam Srivastava, Raghuvir Singh, Mar 2011 in this work analysis of the energy consumption of a WSN node is analysed with proposed node. With the help of this the estimated lifetime of the battery can be increased significantly [14]. It is observed that sensors are used for forwarding data to sink directly so as to reduce energy consumption, packet loss and delay [13].

III. CONCLUSION

Reliable and efficient WSN is the need of the today's communication technology and has been able to capture the attention of several researchers. The dual mode working of the sensor nodes in the WSN has been able to reduce the delay. Also the

lifetime is increased by not eliminating the nodes directly when then go in the isolation state. Energy of the node being one of the several important factors, has to be worked upon by monitoring and with the help of the knowledge acquired by the survey. It also motivates to consider the mobile nodes and not just the stationary nodes and we can improve the computational power by optimal sensor deployment in wireless sensor network.

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