

Consistent and Effective Data Acquisition in Wireless Sensor Networks in the Existence of Transfaulty Nodes

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ABSTRACT

The sensors in the WSN sense the adjacent, collects the data and deliveries the data to the sink node. It has been noticed that the sensor nodes are deactivated or damaged when obvious to committed radiations or due to energy problems. This damage leads to the transient parting of the nodes from the network which procure in the building of the holes. These holes are dynamic in nature and can spread and pact dependent upon the features causing the damage to the sensor nodes. So a solution has been reachable in the base paper where the twin mode i.e. Radio frequency and the Acoustic mode are considered so that the data can be transferred smoothly. Grounded on this a survey has been done where some problems are considered so that the performance of the system can be enhanced.

Keywords

Energy hole problem, Sensor deployment, Wireless Sensor Network.

1. INTRODUCTION

WSN is the collection of a number of nodes which transfers the data. There are certain features which interrupt the enactment of the sensor nodes and might even damage them. Equally there is no damage to the sensor nodes, it rests to work in the radio frequency mode, as soon as there is the node failure, and the acoustic mode is activated. The data is then mined and moved further. The elimination of the impaired nodes from the system cannot be the solution as all resources and the services associated with the sensor node can be utilized yet again when they are fine again. It likewise supports in rising the life expectancy of a network. Hence the functioning of the model in dual mode indicate to be greater, as we adjustment to the supplementary sleeping nodes and transfer the data with the help of them. Also the range of the node displays the equal major role while the data is moved from one node to the other. The motivating features related to this are increasing the life expectancy of the wireless sensor network by the fault tolerance and the fault node acknowledgement, also dynamic useful communication has to be there between the nodes so that the deviation in the topology can be imaged immediately and data can be engaged with smallest amount delay.

2. RELATED WORK

The paper presented by the Pushpendu Kar and Sudip Misra Jan 2016 conveys us through the facts of in what way the twin mode i.e. radio frequency and the acoustic mode can be applied for the effective and capable data transfer. Likewise put importance on the data mining procedure. Due to the planned system the data can be lead additional adroitly [1].

In the paper presented by Kealan McCusker, Noel E. O'Connor May/June 2011 a clarification for allocating symmetric keys and network access control in a WSN using IBC is offered. The suggested system was predictable beside famous attacks on a WSN and found to implement fine. Some groups implement for Tate pairing in hardware but are aiming the latency metric and also Field Programmable Gate Arrays (FPGAs) slightly than energy and an ASIC, accordingly these assistances lack of above the planned theory which is many scales advanced than what is accomplished by applying the pairing in hardware, and too extraordinary for the insufficient energy reachable to a node. Work is essential in edict to implement extra constituents of the system such as the elliptic curve point growth and exponentiation in the field [2].

Cesare Alippi, Giuseppe Anastasi, Mario Di Francesco, and Manuel Roveri Feb 2011. In this paper authors scheduled an adaptive sampling algorithm that guesses online the ideal sampling frequencies for sensors. This technique, which wants the scheme of adaptive measurement systems, decreases the energy consumption of the sensors and, incidentally, that of the radio though maintaining a very great exactness of grouped data. It can achieve similar to a fixed-rate system where the sampling frequency is well-known in development. This technique consequences in an equivalent energy saving of composed the sensor and the radio. Result deeply rest on the exact sensor, whose power consumption is perceptively higher than that of the radio [3].

Levente Buttyán, László Czap, and István Vajda Nov/Dec 2011. In a pollution attack, the opponent nastily changes definite of the stored encrypted packets, which consequences in the inadequate decrypting of a vast quota of the single data upon retrieval. Authors advised algorithms to identify and improve commencing such attacks. This paper can be functional in any coding-based distributed storage systems, be it in the domain of P2P file distribution or in wireless sensor networks. In particular, this method does not need the storage nodes to realize additional coding on or to improve extra information to the encrypted packets. Suggested algorithm is effective and tremendously capable together in terms of communication and computational overhead. It does not scale up to very vast schemes in relationships of computational complexity [4].

Ing-Ray Chen, Anh Phan Speer, and Mohamed Eltoweissy March/April 2011. Author's proven adaptive fault-tolerant quality of service (QoS) control algorithms grounded on hop-by-hop data transfer using "source" and "path" redundancy, with the objective to satisfy solicitation QoS requirements while spreading the life expectancy of the sensor system. Algorithm which incorporates path and source redundancy mechanisms to satisfy query QoS requirements though

exploiting the life expectancy of query-based sensor networks [5].

Masanori Miyazawa and Michiaki Hayashi Rolf Stadler 2nd Jan, 2015. The paper put forward a distributed management function, called virtualized network management function (vNMF), to identify disasters related to virtualized services. vNMF classifies the disasters by monitoring physical-layer statistics that are controlled with a self-organizing map algorithm. Memory leaks and network congestion disasters can be effectually noticed and that the precision of disaster finding can be expressively improved related to mutual k-means clustering. The advised vNMF is likely to assist scalable network management in the direction of extra difficult 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 take in and its significance on the electrostatic force is advised. Of noticeable significance is the vulnerability of GaAS MEMS devices to radiation effects, as initiate in this work. Such properties, if present, may be detached by suitable policy techniques, for example revealed in the additional RSC switch configuration. It is mightily advised that devices of this type be wisely deliberated for radiation effects earlier to ingestion in systems with a space or nuclear radiation environments. [7].

Erfan Soltanmohammadi, Mahdi Orooji, Mort Naraghi-Pour Jan 2013. The problem of decentralized recognition in wireless sensor networks in the existence of one or extra classes of impish nodes. Binary suggestion testing is considered where the honest nodes take their binary selections to the fusion center (FC), while the impish nodes carry false messages the challenging of decentralized detection in wireless sensor networks in the presence of one or more classes of impish nodes. Binary proposition testing is considered where the honest nodes carry their binary decisions to the fusion center (FC), while the impish nodes carry false messages [8].

3. PROPOSED WORK

We advise a scheme, named ReDAST, for consistent and effective data collection in an immovable WSN in the occurrence of transfaulty nodes. Due to the transfaulty

presentation, a sensor node becomes tentatively unreachable from the network. Temporary node parting leads to the formation of dynamic communication holes in the network, which creates and evaporates dynamically. Likewise, they may growth or contraction in scope dynamically as well. These properties importance in loss of information in the radiation-affected area. To duck information loss in WSN due to transfaulty behavior of sensor nodes, in the advised scheme, we assumption the network using sensor nodes having twin mode of communication—RF and acoustic.

4. ARCHITECTURAL VIEW

The architecture diagram of the system shown underneath aids us to comprehend the system.

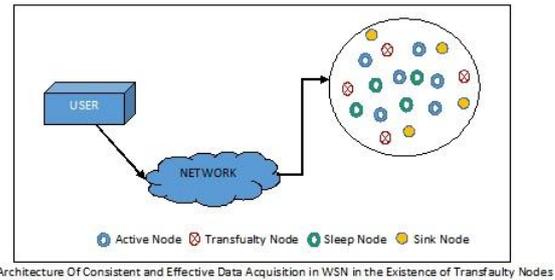


Figure 1:- System Architecture

In the proposed system, prepared GPS allowed identical sensor nodes to build a WSN. Here all of the sensor nodes have the identical capability of sensing, transmitting, and receiving. Totally node identify their location by GPS or any location services. To work in radiation-prone environments and carry on communication between sensor nodes, a node has dual mode of communication. The dual mode contain of radio frequency (RF) communication mode and acoustic communication mode. Normally a sensor node handovers via the RF communication mode. The RF communication come to be exaggerated due to the effects of radiations, which disables the sensor nodes from communicating. Therefore, in the existence of radiation effects, the sensor nodes change to the acoustic communication mode. Acoustic communication does not get exaggerated by radiations. Therefore, the sensor nodes continue their communication in the existence of radiations via the acoustic communication mode.

Sr No.	Paper	Technique	Advantages	Disadvantage
1	Data Acquisition in Wireless Sensor Networks in the Presence of Transfaulty Nodes[1]	Reliable & Efficient Data Acquisition in Stationary WSN	Dual Mode Communication	If both mode fails whole network get fails.
2	Low-energy symmetric key distribution in wireless sensor networks	Identity Based Cryptography	It consumes significant amounts of energy	Not suitable for limited energy available to a node.
3	An Algorithm for Reconnecting Wireless Sensor Network Partitions	Partition Detection System (PDS)	Reducing the communication overhead for mobile node	Work only on single agent platform.
4	Adaptive Fault-Tolerant QoS Control Algorithms for Maximizing System Lifetime of Query-Based Wireless Sensor Networks	Adaptive fault-tolerant QoS control (AFTQC) algorithm	Satisfy application QoS requirements while prolonging the lifetime of the sensor system.	It transfers data hop- by- hope. If one hope fails leads to fail the whole network
5	Bio-Inspired Relay Node Placement Heuristics for	A RN placement approach	Guarantees connectivity among a set of disjoint	Does not consider QoS requirements like

	Repairing Damaged Wireless Sensor Networks		segments of a partitioned WSN	bandwidth and intersegment delay constraints
6	Decentralized Hypothesis Testing in Wireless Sensor Networks in the Presence of Misbehaving Nodes	Expectation Maximization (EM) algorithm	Identify the misbehaving nodes and to detect the state of nature	Work on reputation based schemes.
7	Existence of dumb nodes in stationary wireless sensor networks	Dumb behavior in WSN	Search for Dumb node in network	Does not allow for dumb probability estimation, network connectivity, and reduction in energy consumption
8	An Efficient k-Means Clustering Algorithm: Analysis and Implementation	The filtering algorithm (Lloyd's k-means clustering algorithm)	Filtering algorithm is significantly more efficient than the other methods	Algorithm is quite complex and does not provide significantly faster running time in practice

5. CONCLUSION

Consistent and effective WSN is crucial of the today's communication technology and has been proficient to interment the attention of a number of scholars. The twin mode operational of the sensor nodes in the WSN has been proficient to reduction the delay. Likewise the life expectancy is engorged by not eliminating the nodes traditional when then go in the separation state. Energy of the node being some of the crucial concerns, has to be worked upon by monitoring and with the support of the details chosen up by the survey. It also reassures to consider the portable nodes and not just the steady nodes and we can rise the computational power by perfect sensor assignment in wireless sensor network.

6. REFERENCES

- [1] Pushpendu Kar, Student Member, IEEE and Sudip Misra, Senior Member, IEEE, "Reliable and Efficient Data Acquisition in Wireless Sensor Networks in the Presence of Transfaulty Nodes," IEEE TRANSACTIONS ON NETWORK AND SERVICE MANAGEMENT, 8th Jan, 2016.
- [2] Kealan McCusker, Noel E. O'Connor, "Low-energy symmetric key distribution in wireless sensor networks," IEEE Transactions on Dependable and Secure Computing May/June 2011.
- [3] Cesare Alippi, Fellow, IEEE, Giuseppe Anastasi, Mario Di Francesco, and Manuel Roveri, "Adaptive Sampling Algorithm for Effective Energy Management in Wireless Sensor Networks With Energy-Hungry Sensors," IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, VOL. 59, NO. 2, FEBRUARY 2010.
- [4] Levente Buttya' n, La' szlo' Czap, and Istva' n Vajda, "Detection and Recovery from Pollution Attacks in Coding-Based Distributed Storage Schemes," IEEE TRANSACTIONS ON DEPENDABLE AND SECURE COMPUTING, VOL. 8, NO. 6, NOVEMBER/DECEMBER 2011.
- [5] Ing-Ray Chen, Member, IEEE, Anh Phan Speer, and Mohamed Eltoweissy, Senior Member, IEEE, "Adaptive Fault-Tolerant QoS Control Algorithms for Maximizing System Lifetime of Query-Based Wireless Sensor Networks," IEEE TRANSACTIONS ON DEPENDABLE AND SECURE COMPUTING, VOL. 8, NO. 2, MARCH-APRIL 2011.
- [6] Masanori Miyazawa and Michiaki Hayashi Rolf Stadler, "vNMF: Distributed Fault Detection using Clustering Approach for Network Function Virtualization," 2nd Jan, 2015.
- [7] Steven S. McClure, L. D. Edmonds, R. Mihailovich, A. H. Johnston, Fellow, IEEE, P. Alonzo, J. DeNatale, Member, IEEE, J. Lehman, and C. Yui, "Radiation Effects in Micro-Electromechanical Systems (MEMS): RF Relays," IEEE TRANSACTIONS ON NUCLEAR SCIENCE, VOL. 49, NO. 6, DECEMBER 2002.
- [8] Erfan Soltanmohammadi, Student Member, IEEE, Mahdi Orooji, Student Member, IEEE, and Mort Naraghi-Pour, Member, IEEE, "Decentralized Hypothesis Testing in Wireless Sensor Networks in the Presence of Misbehaving Nodes," IEEE TRANSACTIONS ON INFORMATION FORENSICS AND SECURITY, VOL. 8, NO. 1, Jan 2013.
- [9] Tapas Kanungo, Senior Member, IEEE, David M. Mount, Member, IEEE, Nathan S. Netanyahu, Member, IEEE, Christine D. Piatko, Ruth Silverman, and Angela Y. Wu, Senior Member, IEEE, "An Efficient k-Means Clustering Algorithm: Analysis and Implementation," IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, VOL. 24, NO. 7, JULY 2002.
- [10] Vibha Paradkar, Gajendra Singh Chandel, Kailash Patidar, "Fault Node Discovery and Efficient Route Repairing Algorithm for Wireless Sensor Network" (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 6 (2), 2015, 1710-1715.
- [11] Saad Ahmad Khan, Ladislau Bölöni, Damla Turgut, "Bridge protection algorithms – A technique for fault-tolerance in sensor networks" Ad Hoc Networks 24 (2015) 186–199.
- [12] Anasane, Aboli Arun, and Rachana Anil Satao. "A Survey on Various Multipath Routing Protocols in Wireless Sensor Networks." Procedia Computer Science 79 (2016): 610-615.
- [13] Kudale, Roma, and Rachana Satao. "STESA: Self Transmission Energy Saving Algorithm for road surveillance." 2013 Tenth International Conference on Wireless and Optical Communications Networks (WOCON). IEEE, 2013.

- [15] Amit Sharma, Kshitij Shinghal , Neelam Srivastava, Raghuvir Singh, “Energy management for wireless sensor network nodes” International Journal of Advances in Engineering & Technology, Vol. 1, Mar 2011.

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