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Defective Node detection in WSN using Round trip delay and Path

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ABSTRACT

From last few years back, function of wireless sensor networks (WSNs) have been increased tremendously due to its vast potential to connect the physical world to the virtual world. Also its manufacturing cost and an advance in microelectronic fabrication technology reduces efforts to portability. It becomes a trend to apply the more numbers of portable wireless sensors In WSNs to increase the quality of service (QoS).Tha main objective of such WSN is QoS improvement The QoS of such WSNs is mainly affected by the failure of sensor nodes. As soon as no.of sensor nodes increases chances of sensor node failure increases. In order to maintain the better QoS under deficient conditions, identifying and detaching such faults are essential,so as to work remaining WSN more clearly. In the proposed method, We are detecting faulty node by measuring the round trip delay (RTD) time of discrete round trip paths (RTP)and comparing them with threshold value when whole network is in working. In this we are experimenting on two sensor nodes and one control unit(Master Node), communication among these nodes is established through Zigbee based wireless technology.

Keyword : - *Faulty Sensor node,Zigbee,RTD and RTP*

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1. INTRODUCTION

WIRELESS device NETWORK is Associate in Nursing intelligent network system, that utilizes the communication platform to exchange the data and optimizes the operation of interconnected units to enhance the efficiency, responsibleness, and property of wireless devices. Typically, a two-way communication infrastructure is needed to exchange the real-time data between the utilities and consumers. the data exchange allows several new functions and services for sensible network like remote meter reading, control, and detection of unauthorized usage .Wireless network intelligent appliances and diagnoses issues in consumer facet, cut back the energy value and increase the system dependability, efficiency/performance and safety.

Wireless sensor networks (WSN) are known as a connected and intelligent observance system platform for sensible grid systems. as an example, low-priced wireless device nodes are often distributed over wild fields wherever the facility plants are settled and might enhance utility asset watching capabilities. The management centre will collect the data from remote wireless sensors to notice the behaviour of the node and manage the soundness of network. WSNs can play a crucial role in automatic fault detection, remote system watching, remote home/customer site watching, equipment fault identification and etc. Further, wireless sensor networks (WSNs) mistreatment sensors like lightweight and temperature sensors will enhance the responsibleness, safety and security of sensible network system by providing wealthy surveillance info for node failure detection and recovery, energy supply watching, quality management, etc.

2. OVERVIEW OF WSN

In the planned methodology, faulty sensing element node is detected by measuring the round trip delay (RTD) time of distinct round trip methods and comparison them with threshold value. Initially, the advised methodology is to experiment on WSNs with 2 or 3 detector nodes designed mistreatment microcontroller and zig Bee.. The RTD time results derived in hardware and code implementations are virtually equal, justifying the important time pertinency of the investigated methodology. Necessity of received signal strength measuring in cluster head variation and distribution separate wavelength for every link in alternative fault detection techniques are overcome here.

Researchers see WSNs as Associate in Nursing ‘‘exciting rising domain of deeply networked systems of low-power wireless motes2 with a little quantity of central processing unit and memory, and enormous united networks for high-resolution sensing of the environment’’. WSNs generally transmit info to grouping (monitoring) stations that aggregate some or all of the knowledge. WSNs have distinctive characteristics, such as, however not restricted to, power constraints and restricted battery life for the WNs, redundant information acquisition, low duty cycle, and, many-to-one flows.

Fig.WSN

3. SCOPE OF WORK

Smart wireless networks need to carry reliable and real-time info to the management centres of the utilities. owing to the distinctive challenges obligatory on the sensible grid, the prevailing communications network is unworkable and can't be applied trivially. Revolutionary communication design is urgently demanded. The generated energy-related information are going to be up to tens of thousands of terabytes in the close to future. This poses a major challenge for any existing communication network further because the future network to gather, transmit, and store such large-scale information. The good grid communications design shall cover home areas, neighbourhood areas, and wide areas. Consequently, it's associate primarily heterogeneous network with variety of complementary technologies, that wants intelligent devices/terminals to manage the communications at intervals every subarea and also the communications between completely different service ranges.

The challenge once a number of the nodes don't operate in an exceedingly device network is to make sure the property of the operative nodes and at constant time to produce some minimum coverage whereas making an attempt to stay the quantity of active sensors to a minimum. within the lack of world information of the network and site info in conjunction with energy deficiency, the problem becomes even more durable. a solution which may be applied to general network topologies should be found and enforced. though there are various work in this area, there's still want for a protocol which may schedule node operation in associate economical and adaptative manner while not requiring location information, world network information and also the use of excessive control messages. A location military operation mechanism such as the world positioning system (GPS) would be terribly costly to use in {a very} typical device network consisting of a very sizable amount of sensors. or else, solely an explicit fraction of nodes might have GPS and other nodes may try to find their locations using the information provided by these nodes. This is also costly due to the message exchange load and the results are not always as precise as desired. Therefore, an algorithm which does not require any location information would be of value.

To achieve this we are introducing Round trip delay time and Round trip path analysis to detect faulty node in network. This experiment is carried out with desiging of two slave node and one master node. All three nodes communicate with each other using Zigbee. As the number of tiers in the network increases, the gainAlgorithm decreases with respect to OSSA since the randomness in DASSA increases. Thus, DASSA would benefit from a clustered network structure.

Multi-sink scenario where each sink employs DASSA could increase the performance of the algorithm. DASSA can also be used in an heterogeneous network, where a subset of nodes have higher capabilities than the other type of nodes. In such a network, high powered nodes can employ DASSA algorithm within their clusters. For future work, the performance of DASSA can be analyzed for a clustered network and compared with OSSA. Also, the ILP based formulation can be adjusted for finding the optimum scheduling for clustered networks. Partial coverage is a new subject in the context of sleep scheduling and extending the study in this thesis to the clustered case would be of value. Also, a more adaptive version of DASSA where the parameters of the algorithm are modified as nodes die may be studied. Finally, the parameters of DASSA should be tuned to find the real optimum point of the algorithm by using exhaustive search.

4. PROBLEM OF FINDING FAULT NODE IN WSN USING RTD AND RTP

From few years, wireless sensing element networks (WSNs) applications are augmented because of its Brobdingnagian potential to attach the physical world to the virtual world. equally an advance in electronics fabrication technology reduces the price of producing portable wireless sensing element nodes. It becomes a Fashion to use the massive numbers of transportable wireless sensors In WSNs to extend the standard of service (QoS). The QoS of such WSNs is principally suffering from the failure of sensing element nodes. probabilities of sensor node failure will increase with increase in range of sensors. so as to take care of the higher QoS underneath failure conditions, distinctive and detaching such faults square measure essential. within the planned methodology, faulty sensing element node is detected by activity the trip delay (RTD) time of separate trip methods (RTP)and scrutiny them with threshold value.

During this we tend to square measure experimenting on 2 sensing element nodes and one management unit(Master Node), communication among these nodes is established through Zigbee wireless technology. The analysis papers collected square measure summarized as bellow.

5. LITERATURE REVIEW

[1] RavindraNavanathDuche and Nisha P. Sarwade, "Sensor Node Failure Detection Based on Round Trip Delay and Paths in WSNs," in IEEE SENSORS JOURNAL, VOL. 14, NO. 2, FEBRUARY 2014

This paper Method described to detect the fault is successfully implementedand tested in hardware and software. Due to complexityin hardware implementation, WSNs with large numbersof sensor nodes can't be realized to verify the suggestedmethod. WSNs with various numbers of sensor nodes like 10, 20, 30, 40, 50 and 100 are implemented and tested in software.

[2] Irfan Al-Anbagi, MelikeErol-Kantarci, Hussein T. Mouftah, "A Survey on Cross-layer Quality of Service Approaches in WSNs for Delay and Reliability-Aware Applications," Citation information: DOI10.1109/ COMST. 2014.2363950 Communications Surveys & Tutorials.

In this paper, we have a tendency to present a survey on the state of the art of cross-layer QoS approaches in wireless terrestrial detector networks to attain delay and dependability bounds in crucial applications. Our paper provides a singular classification of cross layer QoS approaches in WSNs that permits measuring an oversized quantity of studies with utmost clarity. what is more, we have a tendency to highlight the most challenges of implementing QoS protocols in WSNs and gift an summary of QoS-aware WSN applications.

[3] **LukmanRosyidi, Hening Pram Pradityo, DediGunawan, RukiHarwahyu, RiriFitri Sari "Dual Hop Multicast Ping Method for Node Failure Detection in ZigBee Loop Network" in International Conference on Information Technology Systems and Innovation (ICITSI) 2014Bandung-Bali, 24-27 November 2014ISBN: 978-1-4799-6526-7.**

This paper reviews node failure detection methodology in ZigBee loop network. ZigBee network was popularly used for low power and low value implementation of wireless information transmission. Node failure detection is required so as to take care of the network dependability. Common node failure detection ways area unit supported ZigBee mesh networking capability.

[4] **Fu Cai, Cui YongQuan*, Han LanSheng, Fang ZhiCun,**

"Projection Pursuit based Wormhole Detection in Ad Hoc Network," in The 2013 IEEE International Conference on High Performance Computing and Communications & 2013 IEEE International Conference on Embedded and Ubiquitous Computing.

In this paper, they propose a wormhole detection mechanism based on Projection Pursuit to detect wormhole. Projection Pursuit is a novel statistical method and its basic idea is to project high-dimensional data on low-dimensional (1-3 dimensional) subspace to find projector that reflects structures and characteristics of data. The feasibility of detecting wormhole by Projection mechanism is based on the following aspects:

(1) The multi-attribute and multi-state characteristic of wormhole data makes it suitable for using projection pursuit multidimensional data processing method. When multiattribute and multi-state data constitute a high-dimensional data with over three-dimensional, data characteristics can not be observed from the image, but we can use projection to reduce the dimension.

(2) Projection Pursuit can solve nonlinear problems. Wormhole Data is real-time network data and distributes randomly. Although projection pursuit is based on linear projection, it's looking for a non-linear structure.

(3) Wormhole has time correlation characteristics. The normal performance of wormhole nodes within certain period of time can interfere with the overall test results, while the degree of the interference can not be observed and compared by act of man; however, projection pursuit method can exclude those having no or little correlation with data structure and find out the optimal projection direction.

5] **Yanbo Zhang, Jiansheng Cao, Xinli Mei "Research on Relationship Between Memory Scale and Lifetime of WSNs with Cluster Mechanism"2012 2nd International Conference on Computer Science and Network Technology.**

In this article, they use completely different values of memory scale to check the cluster mechanism deployed in WSNs. Results show that with the rise of memory value the lifespan|period of time|period} of WSNs has the tendency of more longer existing period. Well, once the memory scale is the integral multiple of ten, such as 10, 20, 30, etc., the lifespan are going to be the lowest value. This paper offers a qualitative analysis of the relation between length of memory scale and lifelong in WSNs with cluster mechanism.

[6] **Ying-Hong Wang, Kuo-Feng Huang, Shaing-Ting Lin "A Grid-based Hole Detection Scheme in WSNs" 2011 International Conference on Network-Based Information Systems.**

Wireless sensing element Networks (WSNs) will be wide used in several applications, particularly in environmental surveillance. However, there exists some holes at intervals the WSNs caused by some factors, like non-uniform preparation of sensing element nodes, some depletion of energy from sensing element nodes, the destruction from external forces and also the existences of physical obstacles, like mountains and lakes. These holes can degrade the

performance of wireless sensing element networks(WSNs). Hence, a way to realize the position of the holes and utilize the data to boost the performance of WSNs could be a important issue. so as to unravel this downside, we tend to proposed detection theme for grid-based hole in WSNs. By means that of grid design, we tend to use the grid head to broadcast and forward the request and reply to hole detection. And then, sink can calculate the position of the holes for up the performance of the WSNs.

[7] **R. Morello, C. De Capua, A. Meduri, "Remote Monitoring of Building Structural Integrity by a Smart Wireless Sensor Network" IEEE 2010.**

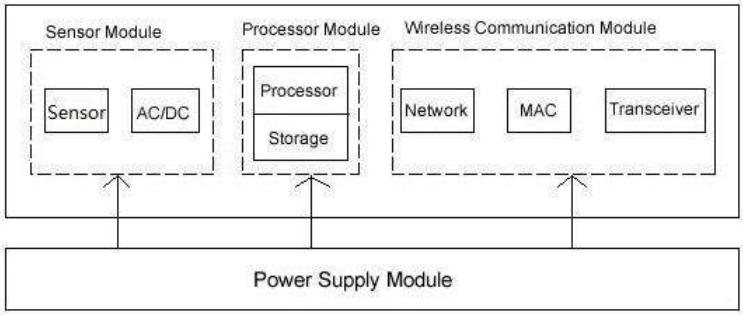
The present paper proposes a wireless device network so as to verify the building structural health by monitoring the vibration levels transmitted. specifically the network permits to assess if the vibration levels might cause injury to the building or if it wants additional study. The vibration levels are compared with mounted thresholds urged by studies and rules. the eye has been targeted on the dependableness of activity results and, for this purpose, 2 algorithms are enforced. the primary takes under consideration the activity uncertainty of every device network node so as to verify the overcoming of mounted threshold through the employment of acceptable decision-making rules. The second algorithmic program permits to observe attainable faulty sensors so as to confirm appropriate levels of dependableness concerning the selections taken on the idea of activity information, of near sensors and of historical standardization data. The common device networks used for structural watching incorporates wired information acquisition system; otherwise the projected answer uses the ZigBee technology for wireless communication so as to enhance the flexibleness and capability of the network.

[8] **Válter Rocha,, Gil Gonçalves3 "Sensing the World: Challenges on WSNs" 2008 IEEE.**

The goal of this text is to spot the analysis challenges on WSNs by dividing them into purposeful teams, building on previous work. we have a tendency to followed a structured approach supported a simplified nevertheless complete vision of a style house for WSNs. Moreover, this work aims to spot analysis gaps and investigation fields nevertheless undiscovered or hardly explored by analysisers so as to plot ways for future research. many challenges and analysis areas were known, like Models for device Networks, Benchmarking Methodologies, Distributed process, Interface WSNs and Network Reprogramming.

6. SENSOR NODE ARCHITECTURE

A sensor node is made up from sensor modules, processor modules, wireless communication modules and power supply modules, as shown in Figure 2. The sensor module is responsible for monitoring the area of information collection and data conversion. The processor module is controlling the operation of sensor nodes, storage, processing its own collected data and other nodes 'received data. The wireless communication module is used for the wireless communication with other sensor nodes. It also works with exchange control messages and sends/receives data collection. The power supply module for the sensor nodes provides the energy required for working..



7.FINAL HARDWARE DESIGN

Fig.Final hardware

8. CONCLUSION

This thesis set forth an effective fault detection mechanism to save the energy of sensor nodes and fast recovery of system. We dynamically calculate threshold time and active time according to the remaining energy of sensor nodes. It will save much power of sensor nodes and make extend the life time of the entire wireless sensor networks. By the simulation results, we can demonstrate that the proposed mechanism could effectively reserve the energy of sensor nodes and prolong the network lifetime.

9.REFERENCES:-

[1]RavindraNavanathDuche and Nisha P. Sarwade , "Sensor Node Failure Detection Based on Round Trip Delay and Paths in WSNs," in IEEE SENSORS JOURNAL, VOL. 14, NO. 2, FEBRUARY 2014.

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[3] LukmanRosyidi, Hening Pram Pradityo, DediGunawan, RukiHarwahyu, RiriFitri Sari "Dual Hop Multicast Ping Method for Node Failure Detection in ZigBee Loop Network" in International Conference on Information Technology Systems and Innovation (ICITSI) 2014Bandung-Bali, 24-27 November 2014ISBN: 978-1-4799-6526-7.

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[6] Ying-Hong Wang, Kuo-Feng Huang, Shaing-Ting Lin "A Grid-based Hole Detection Scheme in WSNs" 2011 International Conference on Network-Based Information Systems.

[7] R. Morello, C. De Capua, A. Meduri, "Remote Monitoring of Building Structural Integrity by a Smart Wireless Sensor Network" IEEE 2010.

[8] Válter Rocha,, Gil Gonçalves3 "Sensing the World: Challenges on WSNs" 2008 IEEE