Failure node identification in mobile wireless sensor networks

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Abstract: Wireless Sensor Networks are subjected to node failures mainly due to restricted energy resource of sensors and harsh environments, and thus lead to failure of the sensor network. Failure of a node in WSN can split the network into components thereby partitioning it into disjoint sets which contributes to communication loss between the sender and the receiver. To overcome this loss of communication, there are two possible solutions: one solution is to restore the communication by either relaying an extra node at the damaged area, and another to exploit the existing node to bring back the connectivity. The distributed and localized algorithm is effective than the centralized approaches where the entire network topology must be known prior to the restoration of the network. This paper brings out the different approaches to handle the failed node in WSN.

Keywords – faulty node, network partition, wireless sensor networks, failed node

1. Introduction

Sensors are being the vigilant part in many modern surveillance applications like the border surveillance, environment monitoring, military applications, target tracking, health and medical monitoring etc. Wireless Sensor Networks consists of several such sensors which are randomly deployed in large numbers in sensitive, unattended and hostile territories. Each sensor node has a processor, radio, sensor and built-in electrical storage device. These nodes are collected then the data relay sink the node, where the data is groped and analysed. As sensor node have limited transmission range, the nodes transmits data over multi-hop. These nodes are useful thing /valuable supply held back resource constrained in terms of processing power and electrical storage device to hold or do some thing. A typical WSN is shown in fig:

Due to the limited resources faults occur frequently and unexpectedly in wireless sensor networks. The two types of faults aresimple crash failure where it becomes completely unactive and faults where the node behaves randomly. As failures occur to happen in the sensornetworks, it is very important to figure out what nodes of the network are not working correctly.
2. Sources of faults

The main causes for failure nodes are combine error, functioning hardware, surrounding conditions low electrical storage device and link failure. Sensors drifting throughout the network lifetime lower the acceptance of sensor measurements. Discuss three different types of adjustment for accuracy errors namely offset faults, gain faults and drift faults. Sensors with combine the error are treated as permanently not working correctly. Sensor nodes are mainly used for hardware failures were we can have less connections, functioning sensors or other parts/pieces they will report unusually more or less sensor nodes. One such instance referred in explains the hit/effect of water to contact. The other sensors, may lead a short path between the terminals. This are causes unusual more or less sensor readings. This failure may appear continuously or on-and-off on-and-off. The wireless sensor networks between sensor nodes are easily able to be harmed or influenced by wireless channel padding, which happen error or failure. In next field, links may failure when they are permanently or only for a short time blocked by an external object or related to surrounding conditions or the health of the earth interference. Such failures are always short-lived in nature.

3. Effect of faults

The description Section 2 concludes that calibration errors that occur errors caused due to low battery are permanent in nature. This lead to the disturbance for the normal and predictable functioning of the network. In WSN all nodes collectively contribute towards the subject goal. Faulty nodes can alter the data leading to decrease in judgment accuracy of the base station. Faulty data may also increase the traffic in the networks and thereby wasting the energy. Hence from the past decade much attention is attracted towards fault diagnosis in WSNs.

In an useful thing/valuable supply-held back network such as WSNs, fault identical on of a disease or problem or its cause that improves data reliable, effective radio frequency/ability use of the network, and increase in the network may work life time and rearranging/changing the network for better data delivery.

4. Network partitioning

Discussed a time-critical computer program the tunnel watching/supervising system. A set of sensor nodes with wireless communication abilities re sent out and used inside the tunnel for watching/supervising purposes in case of emergency, that is a sudden unplanned bad event/crash involving many nodes, it needs to transmit data related to/looking at/thinking about the tunnel conditions are mainly base stations. In such a picture/situation very close and complete the data given to the base station. So that they can take accurate the date. This are basic things that the network should maintain, the critical data given to the base station is promoted that something will definitely work as described. Connectivity is an extremely important QOS measure in WSNs. The network is always at hard of being split into more than two, but not a lot of disconnected parts/pieces because of the sensor network failure caused by different factors. One such interesting issue related to not working correctly nodes is Network separating with walls. Network separations with walls is a situation where the set of nodes dividing wall/section into n number of disconnected sets due to the event of a not working correctly node.

We can take the connected graph, where V is a highest point then take the node and E the edge set or the set of wireless links. Over a period of time t, if the network detects not working correctly nodes, then the graph G splits into disconnected graphs G1, G2…etc. Fig shows a separated with a wall.

Wireless sensor networks are able to take the failure of nodes in the network, and all the networks run in time. Failure nodes are not working correctly some terms are changed in the rest of the paper.
5. Related work
In this project, failure nodes can be one or many sensor nodes may use the less of communication links and separate them with related networks into many separated by of proper place parts.
In this we have are two ways to solve network problem to solve the network may tolerate the nodes failure, and another to retrive the network connectivity to control relocation of moving nodes if a separations with walls is detected. This paper brings out more than two, but not a lot of things that are given/work that done towards these approaches.

A. Proactive approaches
Acting to prevent problem before they happen methods are the prevention machine/method/way approaches. These approaches can in a way that produces a lot with very little waste better the network failures with minimum cost, and is easier to be put into use. In case dividing wall/section happens during the operational phase, a causing reactions from other people or chemicals rebuilding/renewal reactive is unavoidable.

In to detect dividing walls/walls off/section in the networks, rules of conduct based on changes of message flooding machine/method/way is employed. The problem of using a minimum cost connected graph is taken to be NP-hard problem, many close guess sets of computer instructions have been proposed for different values of the integer k. In an only happening or existing in one small place distributed topology control set of computer instructions (LDTC) for k ruling over set is used instead of keeping the whole network-k-dominating set is used instead of keeping the whole network k-ruling over is put forward in order to get an improved topology with at most r-hop only happening or existing in one small place topology knowledge. Lilly-Wang proposed a machine/method/way for network separating with a wall using Simplicial Complex set of computer instructions on the connected graphs.

Ghufran have proposed power control routing set of computer instructions for energetic/changing transmission. The proposed rules of conduct leads to low energy use and reduces packet retransmission by reducing the argument or point in an argument among nearby nodes.

B. Reactive approaches
As discussed earlier proactive approaches are used as prevention mechanism. In case partition will place during the operational phase, a reactive restoration is invisible.

More than two but not a lot of research work has been carried and controlled by one central place useful thing/valuable supply recovery through added/more relay node use/military service. A relay node is thought of as a more useful thing/valuable supply rich node compared to that of an ordinary sensor node. The main aim is to use the least number of relay nodes for completing or gaining with effort connectivity. Different experience based thinking approaches have been proposed in. In Minimum Steiner Tree is used to represent the minimum set of nodes which makes a need or reaching a goal, the connectivity with the remaining nodes of the network. In a separated with a wall wireless sensor networks, connectivity can be restored without depending on the external relay nodes.

They have proposed a approach that a node positioning approach to identify the problem of connectivity restore in separated with a wall wireless sensor networks. The approach explains the idea of Game explanation of why something works or happens the way it does among the relay nodes and the dividing walls/walls off/sections. They have proved that the Game Theoretic approach outperforms the a measure of what occurs naturally sports boundary line approaches under all conditions.

6. Conclusion
The paper brings out an analysis on faulty nodes. Faulty nodes are one which either crash or behave maliciously due to minimized residual energy or due to the deployment in hostile environments. With the presence of a faulty node in the network, the network may suffer a communication loss between the sender and the receiver leading to a partition in the network. Network partitioning is a situation in which the network splits into disjoint components due to the presence of a faulty node. In time-critical and
safety-critical applications, restoration of the network is of primary concern. In this regard, two different approaches are discussed viz., proactive and reactive approaches. The literature has witnessed many centralized approaches which require the global knowledge of the topology. Distributed and localized approaches are inviting more and localized approaches are inviting more researches now a days.

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