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Sensor Deployment Algorithm for Hole Detection and Healing By Using Local Healing

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Abstract: **The main services provided by a WSN (wireless sensor network) is monitoring a particular region ie, RoI or specified region. The emergence of hole in that particular region is unavoidable. Due to some environmental factors, Random deployment and external attacks etc. In this work hole detection and hole healing process are discussed .Here show that heal deals with some virtual forces. According to the size of hole and also to improve the coverage area and need more energy efficient process.**

Keywords: **wireless sensor network, Hole identification, Hole detection, RoI.**

I. INTRODUCTION

A WSN is based on small sensors which are capable of sensing or monitoring a particular region .These sensors are communicating with each other. These small sensors are deployed in the target location for sensing that area. Due to the random deployment or sudden shock or external attack these sensors become failure. And thus occur the absence of sensors. Such that a particular area could be monitored. Due to this anomalies resulting the formation of different kinds holes. Such as coverage holes, routing holes etc. Here taken a large bounded hole such that the area not covered by any node. The important challenge that need to be overcome by WSN are the coverage as well as the energy consumption and the limited battery life. Sensing and communicating are the two task that a node perform. The nodes are able to communicate with the neighbours such that a packet from a source can reach its destination if there are no holes present. If the event that occurring the holes neither detected or if not reported there will be a coverage problem occurred. So we promote a self organizing mechanism to detect and to recover the presence of hole in our network. This is the main task of our network. For this process there are several steps regarding to the detection and healing. Healing is not an algorithm it's a usual steps together through these process called as healing. The need of a complete solution together called hole detection and healing (HEAL) that may in most effective manner. Also this avoid the drawbacks of the previous works. The sensor deployment algorithm for hole detection and healing by using local handling is the solution which is a distributed and localized algorithm ,that can carried out in two phases. The first phase consist of three steps: Hole Identification, Hole discovery and border detection. The second phase consist of the healing process. And also improve the coverage area and become more energy efficient such that energy level of each and every node is improved. So that the nodes life time is dramatically increased. During the healing process is done had given a more power or a penetration. Power to avoid the obstacles such as walls or buildings that present in that particular environment. So that it can increase the coverage area also at the end of the deployments of the nodes no nodes is present in the obstacles. For evaluating the HEAL can compare with others. According to the movement, Coverage area and the total distance travelled for comparison here use the DSSA and SMART algorithm. And also consider a large number of nodes having large holes. For calculating the radius or size of hole global operations are done in olden days .Now by using some rules it can calculate easily.

II. THE PROBLEM DEFINITION

Different types of holes and various characteristic of holes are occurred. Such that during the normal operation of the network a great loss occurred.eg:the several holes will made a network inactive or ineffective. A single hole makes the whole network damage or make it not such an effective manner. Before the proposed method make these following assumptions:

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1. Consider a dense mobile WSN having more number of sensors that are deployed in an area having some obstacles.
2. The deployment may be random or not.
3. All the nodes be homogeneous.
4. The location information are available through GPS system.
5. Consider a sensing model ask the sensor range,Rc the communication range .And also Rc≥ 2Rs because inorder to ensure the TENT rate.

III. PROPOSED SYSTEM

In this ,propose HEAL, it's a localized and distributed hole healing algorithm as opposed to the centralised approach and it is related to a distributed system. For the complete work it should follow the following criteria.

1. Determining the boundary of the area.
2. Detecting the coverage area of the hole and also its character.
3. Determine the target nodes and also extra penetration power is needed to given for each node.
4. Relocate each node according to the target with minimum moving and messaging cost. Such as to increase the life time of a node.

IV. SENSOR DEPLOYMENT

For the construction of this project design domain NS2. And having some system requirements: For hardware of processor with Pentium 111 and speed of 1.5GHz with memory (RAM) 256MB,harddisk of 40GB is needed. The software used is the operating system is linux and TIL scripting language .And this can be operated in a virtual machine box.The sensor nodes are deployed over some region or area for the phenomenon that are should be monitored. Here each and every node in the WSN maintains the details of the neighbour node.

V. HOLE IDENTIFICATION

This process is comes under the hole detection. Such that, when only the hole identification is done process is initiated. The hole existence of a hole which is done by identifying the stuck node which are the boundaries of a hole.In order to find out the stuck node executes TENT rule. To identify stuck node must assess the existence of a hole such that by executing TENT rule. So can check whether the node p is a stuck node by the following steps. If no angle spanned by a pair of adjacent neighbour greater than $2\pi/3$ is not a stuck node.

1. For each p,order all of its neighbours in counter clockwise.
2. For each adjacent pairs (u,v) draw a perpendicular bisector of the two edges with p(u,v)(v,p).
3. They intersect at a centre o. If o is in communication range of p, then no black region (ie; all are in communication range), So p cannot be stuck in the direction upv.

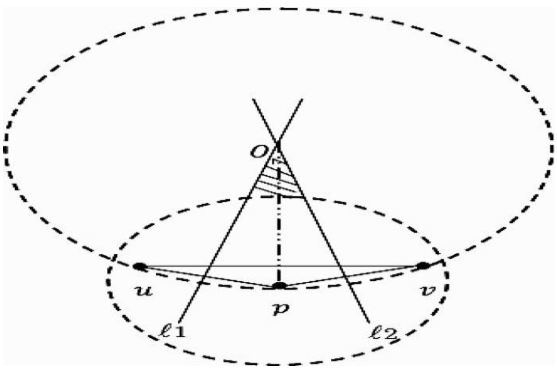

Fig 1: p is strongly stuck node

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A node is strong stuck if it has at least one stuck angle. And if angle upv is <120 degrees ,p cannot be stuck (the point black region disappears).The computation of TENT rule can be performed with only information on 1-hop neighbours.

VI. DISCOVERY OF HOLE

The nodes that are marked as stuck nodes by using TENT Rule discover the holes.Stuck node and border nodes are similar to this algorithm. Consider a stuck node bi having the same ID creates a new hole –discovery packet,whose aim is to collect the location information about the boundary nodes and then forward to next. This process is repeated until the HD packet travelled around the hole and received by the initiator node bi . At the end,the node having the smallest hole ID removes the HD packets and name itself the hole manager (HM).

VII. BORDER DETECTION

The network boundary nodes will execute the TENT rule and detect that they are the stuck nodes. Each stuck node launches the distributed hole detection algorithm (DHD) to identify the nodes that surrounded the hole. In the HD packet define four variables to identify the network boundary Xmax; Ymax; Xmin; Ymin.Each stuck nodes which receives a HD packet compares the coordinates Xmax; Ymax; Xmin; Ymin. Each defined in the packet with its co-ordinates.at the end the largest hole that defines the network boundary will define by these co-ordinates.

VIII. PRINCIPLE OF HEALING PROCESS

After the determining the stuck node and boundary nodes the nodes in the local area of the holes involved in the healing process. A virtual force that from the hole centre will move the nodes towards the centre repulsive forces also defined to minimise the overlapping in between the nodes.

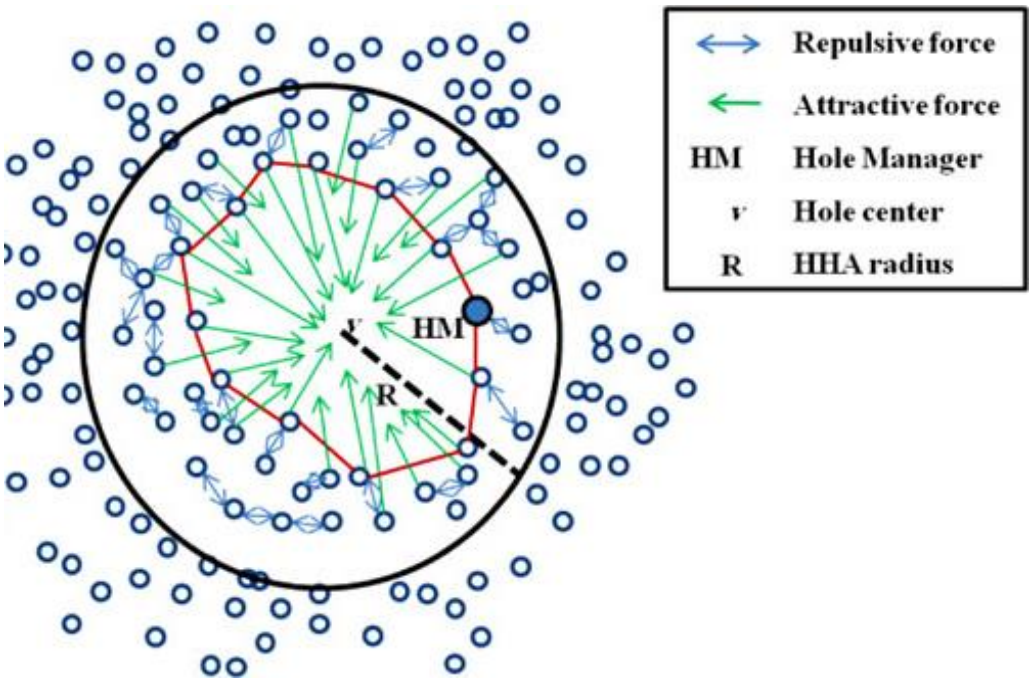

Fig 2: principle of healing process

The HM calculates the centre and size of the hole. The node relocation will done by the attractive and repulsive force.ie:the concept of the virtual forces. There are certain threshold values. The movement is the resultant of both forces.

IX. SCENARIO- VALIDATION OF HEAL

The validation of Heal is based to the DSSA and SMART both are a schedule based protocol, its objective is to assign the time slots to the nodes and avoid collision.

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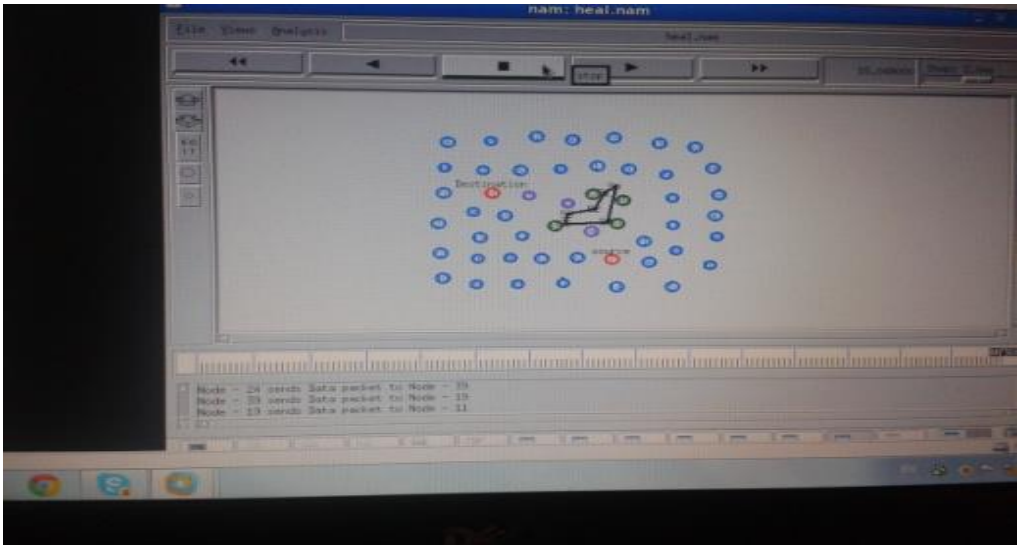

Fig3 Heal to cope with obstacles

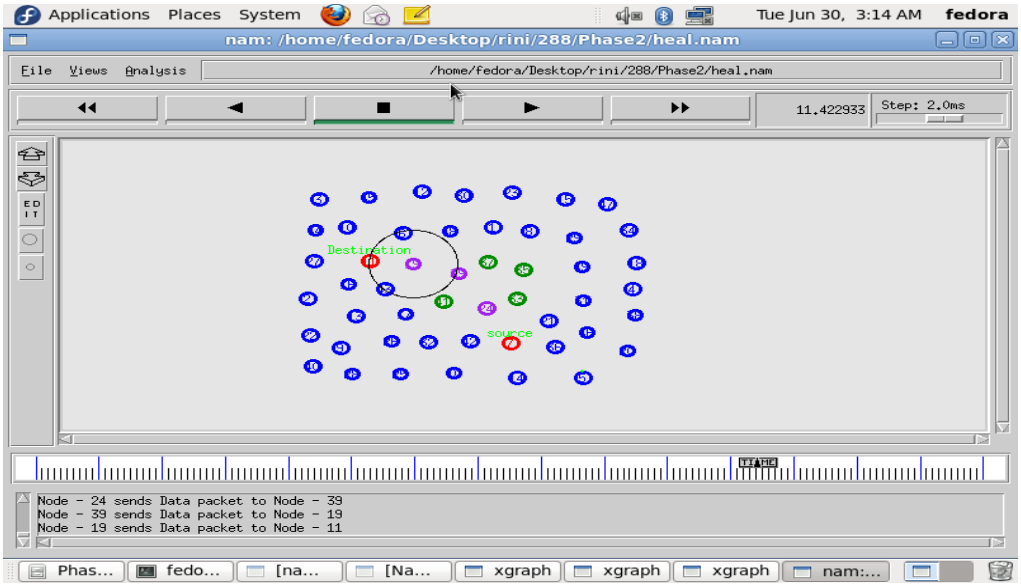

Fig4: energy based healing

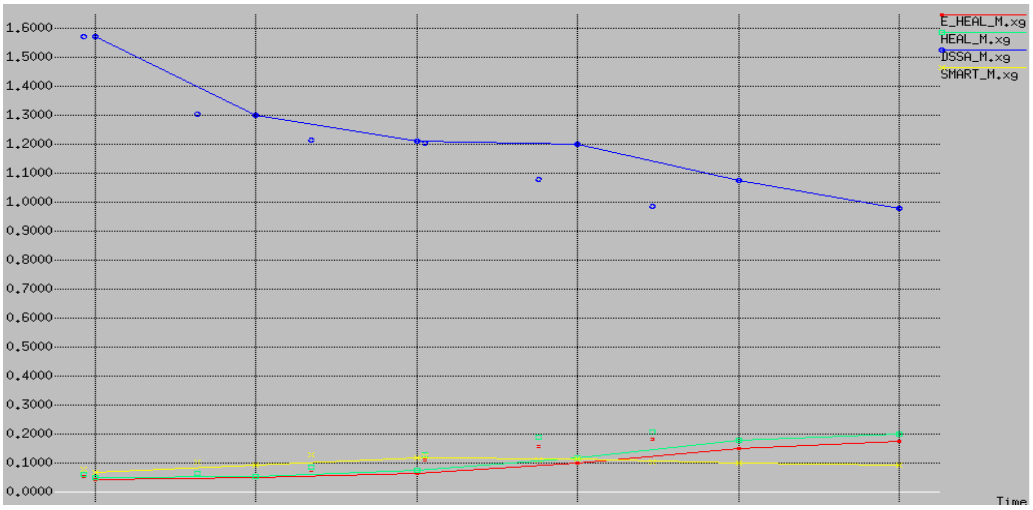

Fig5: Comparison in terms of movement

The comparison is to see the performance of heal, when it is used to improve the network coverage

Fig 6: Comparison in terms of coverage

That the HEAL to cope with obstacles such that nodes gets a penetration power. It will improve the coverage and the energy based on a energy efficiency. This will improve the life time of the network.

X. CONCLUSION

Wireless sensor network application become a part of life. So its existing problem should affect the network. This paper proposed a method of energy efficient healing. So increase the coverage area. By introduce an energy based local healing based on the energy level of nodes will improve the sensors life time and also the networks.

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