Implementation of An Algorithm For Efficient Route In Wireless Sensor Networking

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Abstract- *It has been numerous years to research the networking area to find the best possible routes in wired and wireless networking. A wireless sensor network (WSN) consists of spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure, etc. and to cooperatively pass their data through the network to a main location. The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on. The WSN is built of "nodes" – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. A sensor node might vary in size from that of a shoebox down to the size of a grain of dust, although functioning "motes" of genuine microscopic dimensions have yet to be created. The topology of the WSNs can vary from a simple star network to an advanced multi-hop wireless mesh network. To overcome the problems of WSN, we have implemented an algorithm for Wireless Sensor Networks using layered chain approach that has provided us state of the art results.*

I. INTRODUCTION

A wireless sensor network (WSN) consists of spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure, etc. and to cooperatively pass their data through the network to a main location. The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on. The wireless sensor network is built of "nodes" – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Previously, sensor networks consisted of small number of sensor nodes that were wired to a central processing station. However, nowadays, the focus is more on wireless, distributed, sensing nodes. But, why distributed, wireless sensing? When the exact location of a particular phenomenon is unknown, distributed sensing allows for closer placement to the phenomenon than a single sensor would permit. Also, in many cases, multiple sensor nodes are required to overcome environmental obstacles like obstructions, line of sight constraints etc. In most cases, the environment to be monitored does not have an existing infrastructure for either energy or communication. It becomes imperative for sensor nodes to survive on small, finite sources of energy and communicate through a wireless communication channel. Another requirement for sensor networks would be distributed processing capability. This is necessary since communication is a major consumer of energy. A centralized system would mean that some of the sensors would need to communicate over long distances that leads to even more energy depletion. Hence, it would be a good idea to process locally as much information as possible in order to minimize the total number of bits transmitted. Routing node and sensors are shown in fig. 1.

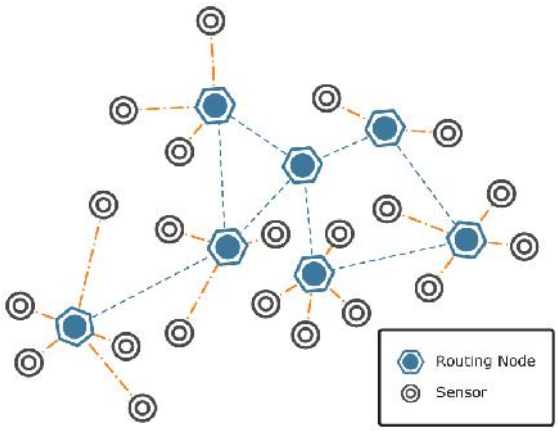


Fig. 1. (Routing node and sensors)

II. DESCRIPTION OF RESEARCH PROBLEM:

Technology has improved and advanced exponentially and wireless networks has play a very vital role in this improvement. In wireless sensor networks sensors play a vital role to gather the information from its surroundings ,

therefore it is very important that there should be efficient routing between the sensors within a network so that the information should reach to the main base station on time without any delay.

The importance of routing is due to the fact that efficient routing leads to the fast communication of information. Routing is a way to get one packet from one destination to the next. Routers or software in a computer determines the next network point to which a packet should be forwarded toward its final destination . Routing involves two basic activities: determining the optimal routing paths for destination networks and transporting information groups, also known as packets, through an internetwork. Research problem can be divided into two simple parts:

1.) Design an efficient algorithm for routing based on the distance metric.
2.) Algorithm should be efficient in terms of energy consumption of the nodes.

III. ALGORITHM

SPRBD works in three phases

(1) Network Construction phase
(2) Chain Formation Phase
(3) Data Transmission Phase

In the begning phase, a route discovery will be initiated, all nodes update their routing table keeping in all details. For example consider a network of four nodes as shown.

For Node A

Source node_id	**Distance**	**Neighbouring Node**
A	2(say)	B
	6(say)	C
	Out of range(say)	D

For Node B

Source node_id	Distance	Neighboring Node
B	2(say)	A
	4(say)	C
	10(say)	D

For Node C

Source node_id	Distance	Neighbouring Node
C	6(say)	A
	4(say)	B
	5(say)	D

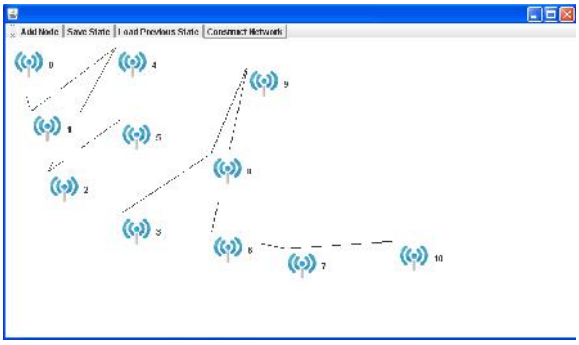
For Node D

Source node_id	Distance	Neighbouring Node
D	Out of range(say)	A
	5(say)	C
	10(say)	B

Route is : D->C->B->A

The snapshots of the network is shown as follows:

This shows a network of 11 sensor nodes. node 0 is assumed to be Base Station.



Connection is shown between node 8 and node 4, this is previously not existing.
Fig. 1. (Connection between various nodes)

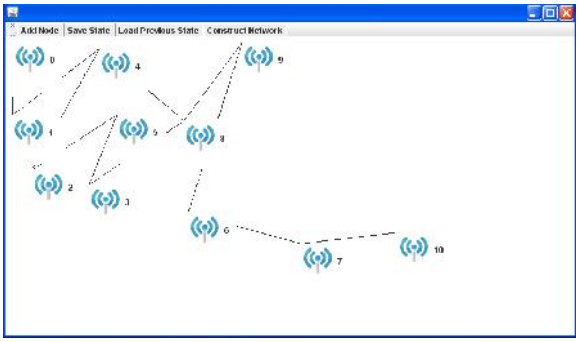


Fig. 2. (Status of network)

IV. ANALYSIS

Fig. 2 and Fig. 3 shows the status of the network during implementation. In this, we basically do comparison of our proposed algorithm with the other routing protocols that are already proposed for the wireless sensor network.

SPIN	Flat	Possible	Limited
LEACH	Hierarchical	Fixed BS	Maximum
PEGASIS	Hierarchical	Fixed BS	Maximum
TEEN APTEEN	Hierarchical	Fixed BS	Maximum
GBR	Flat	Limited	N/A
GEARP	Location based routing	Limited	Limited
EASPRP	Chain based routing	Fixed BS	Low
EESRP	Chain based routing	Fixed BS	Low
EESPRP	Chain based routing	Fixed BS	Low
SPRP	Chain based routing	Fixed BS	Low
EARP	Flat routing	Limited	N/A
AODV	Chain based	Possible	Limited
SPRBD	Chain based	Fixed BS	N/A

Similarly, we have done a comparison on energy factor between the SPRBD and AODV protocol. To calculate the energy we have consider the initial battery energy to be 1J joule/node. Message size is assumed to be K=2000 bits,

Ee=50 nJ/bit, €amp=100 pJ/bit/m².
Energy calculation is given by:
E(K,d) = Ee *K + €amp *K*d²
Caculation of energy for d=0.752m:
Energy for transmission of one message to the B.S by node (d=0.752)=E(K,d) = Ee *K + €amp *K*d²
=0.0001+0.0000276*d
=0.0001+0.0000276*0.752=0.000121 J

Similarly we have calculated the energy for other distances.We have find out the energy for the first round only.

We have calculated the energy consumed by the nodes using each of the protocol. It is shown that SPRBD protocol consumes less energy as compared to the AODV, it means that lifetime of the network in case of SPRBD is much longer than AODV.

V. CONCLUSION

In our implementation, we have included the Euclidean distance metric and the AODV routing protocol for the routing purpose. The results obtained through the proposed algorithm are state of the art results. We have considered a wireless sensor network with fixed number of sensor nodes and all the nodes are assumed to be homogeneous so there will not be any problem regarding the energy consumption of the nodes or the node failure in the system. Level assignment is done on the basis of the calculated diagonal length of the wireless sensor network then the nodes are assigned based on their position in the network. Euclidean distance metric is used for calculating distance of each node in the all the three levels. Finally the AODV routing protocol is used for the routing of nodes in the wireless sensor network

Sensor Networks hold a lot of promise in applications where gathering sensing information in remote locations is required. It is an evolving field, which offers scope for a lot of research. Their energy-constrained nature necessitates us to look at more energy efficient design and operation. The results obtained from the implementation are best and state of the art results.

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