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# An Approach to Select Cluster Head in Wireless Sensor Networks

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***Abstract*: -** Recent advancement in mobile network and wireless technologies has resulted in improvements in sensor networks. But there are various challenges and security threats that disturb the Wireless communication. This paper proposes a technique called cluster head selection, which is used for selecting the cluster head. The longevity of a network can be enhanced by using a group of mobile sensor network. The role of the head of this group is collecting data and forwarding it. This data is transferred to the head by the other nodes in the group. We are using fuzzy logic scheme for selecting cluster head. AOMDV protocol is used for path identification in sensor network.

***Keywords-*** *Wireless sensor network, off-the-cut multipath distance vector protocol, Adhoc on demand vector.*

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## I. INTRODUCTION

Wireless sensor networks are made of cheap mobile nodes. They have limited memory capacity. There are sensor nodes scattered in various places. Sensors are used in various applications like environmental and disaster monitoring, habitat monitoring, military and healthcare applications.

The security and energy consumption are vital characters' of a wireless sensor network. We can reduce the energy consumption by making some nodes to only send data to the primary station. There are group head nodes for collecting the data from the other nodes and transfer the data to the primary station. The group head working functionality can reduce the power utilization and increase the longevity of the sensor node. The location of the cluster head is also very important .The cluster head is always nearer to all nodes. The sensor nodes have one or more base stations. The primary station also acts as gate way to another network. The primary station is identified as a mobile server or as a laptop. It acts as a bridge between sensors and external world. The primary station acts as the main trusted body. Routing in mobile network has some characteristics that make it different from other networks. In the forth coming section, we summarize the routing challenges and problems in wireless sensor network [1].

Node deployment: The node deployment in wireless sensor network can be deterministic or adhoc depending on the applications. The position of group head and sink is also important in mobile sensor network.

Energy consideration: The transmission of wireless channel is also based on how the data can be directed in many so that the energy consumption will be less.

This paper investigate the power management and also routing issues in sensor networks. In section 2 it describes the related work ,we propose fuzzy logic scheme for cluster head selection, AOMDV protocol for route discovery operation. The AOMDV protocol is analyzed with simulated software as per section 4. Section 5 deals with conclusion of the paper.

## II. MULTIPATH ROUTING

Sensor network consumes low power, have short range radio bandwidth. So the sensor nodes uses many hop based routing tool for communication. Standard protocols can be used to decipher one route between the destination and source. These protocols are used to find the best path based on cost. Many skip routing protocol is used to find many paths. Multiple routes are energy and resource constrained to sensor networks. Discovering the multipath routes can yield lot of advantages like fault tolerance, load balancing, reducing delay bandwidth aggregation, redu. The sensor nodes send the steady stream of data to base station at every second. This stream of data is called data flow. The Benefits from multipath Routing are listed below:

Reliability: This means the estimated probability that a message can be generated at one place and routed to the destination. The many paths routing algorithm is applied at the root to distribute the traffic on to many disconnected paths between the source and destination.

Load balancing: when the certain nodes and link can be overloaded, many paths routing can spread the data over alternative routes to balance the traffic. Load balancing will improve the network .The on demand routing scheme always utilize the data traffic at some links only. In many skip routing algorithm the load is distributed on many routes so that the lifetime of the network can be improved.

Bandwidth aggregation: The net bandwidth can be summed up by distributing data having same destination into many branches, where each branch is directed via a different path.

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Reduced Delay: When single path routing protocol is used, it produces delay for route discovery. Backup routes for route failures are used in multipath routing protocols. It reduce the delay for route discovery.

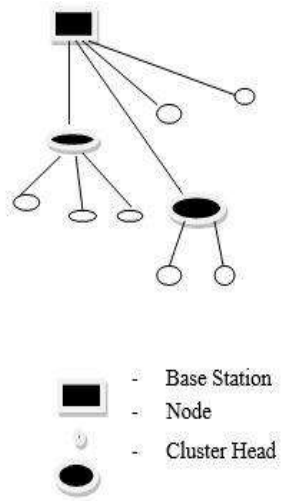


Fig 1 Sensor Node Architecture

To minimize the number of messages that are sent using base station, we need some aggregation scheme for data collection. A summing node gathers all readings from the other sensor nodes and directs one message representing an summed up values. The summed node also is a sensor node. The summed node selection is not static

## III. Cluster Head Selection

In such kind of network, the group head node is always busy with forwarding and collecting data to the primary station. The overloading of the group head node can be minimized by changing the group head node frequently. The group head node devotes more time than the other nodes in communication. The group head plays an important role in mobile sensor network [3]. The group head is selected based on fuzzy control logic. The fuzzy control logic consists of a defuzzifier, fuzzifier, fuzzy rules and an inference engine. There are three factors that affect the network life. They are transportability, energy, and the distance to the main cluster. The group head selection is based on fuzzy control logic [5].

- Node aggregation: total number of nodes available in the group.
- Node energy: amount of energy available for each node.
- Node atomicity: Which node is the nuclear node of the group. In order to decipher the nucleus node, the primary station, calculates the sum of squared distance of the other nodes from the considered node.

The process completes in three steps.

Rule Analysis: here the membership functions are used to get the output in the form of truth values from all the inputs. Then we apply these outputs to get the resultant rules. Then the result is mapped to the truth values to get the output variables.

Fuzzification : In fuzzy logic control system the inputs are mapped to a set of membership function, classified as "fuzzy sets". Fuzzification is defined as a process of changing an input value called crisp value using a set of fuzzy value. The input variables are selected on the basis of concentration, energy, and centrality.

Defuzzification: Aggregate ouput fuzzy chance is the input for the defuzzification process.

## IV. Fuzzy Control

The working of fuzzy system controllers is very simple. There is a processing state, an input stage and an output stage. The role of the input stage is to map various sensors to the membership function. These mappings are invoked in the processing stage to generate results. Certain rules are also applied in the processing stage. These results are combined and generalized to get a specific control output variable. The graphs of the membership functions are triangular, bell shaped and trapezoidal. Triangular shaped curves are of highest importance. Bell shaped and trapezoidal graphs relevance is lower in comparison to triangular graphs. We can use max-min inference method to infer the output of the membership function using Boolean values.

We can parallel solve rules using hardware resources and sequentially solve rules using software. After which we need to defuzzify the results to a crisp value by using any one of the methods available for defuzzification.

We use a variable that represents a node energy level. The concentration is represented by the terms medium, high and low. We can also identify the node centrality by the terms very small, small, large etc. As per statistics it is observed that the chance of getting the output is high if the concentration and energy level is high. The nodes are compared on the basis of outputs. The node having the highest output is selected as the head node of the cluster.

## V. Results And Discussion

For simulation we apply NS2 simulator to analyze the performance of our proposed system. We consider the network model for simulation as per Table 1. We are proposing the working of a sensor in health care environment. There is a performance metric that evaluates the efficiency of the proposed system considering the packets sent, delivery rate, delay and packet received. We define the packet delivery ratio as the number of packets received by all the nodes divided by the total number of packets sent.

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**Table 1 Simulation parameters**

| S.NO | Parameters | Details |
|---|---|---|
| 1 | Node Placement | Random |
| 2 | No Of nodes | 50 |
| 3 | No of sink | 5 |
| 6 | Packets sent interval | 0.5 s |
| 7 | Pause time | 0,100,200,300 |
| 8 | Size of packet | 160 bits |
| S.NO | Parameters | Details |

Cluster head selection scheme is shown in figure 2. Selection of cluster node is done using three descriptiors. The values are then fuzzified and passed to the fuzzy rule base for rule evaluation. Then, the cluster-head election chance is given by defuzzification . The best node 108 on the other hand has all the three descriptors suitable for being elected as the cluster-head with a maximum chance of 75 for the current scenario.

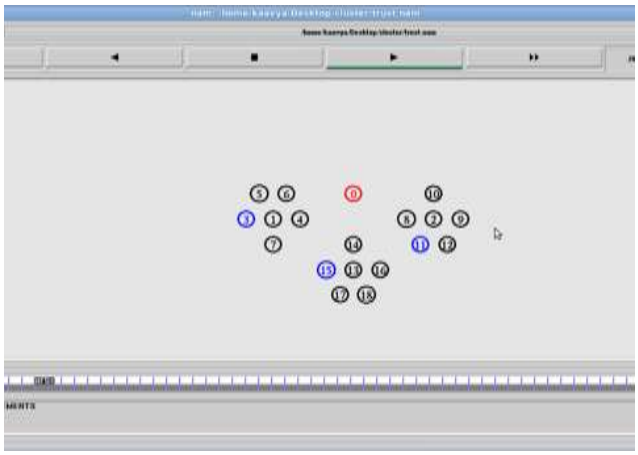

Fig 2 Cluster head selection

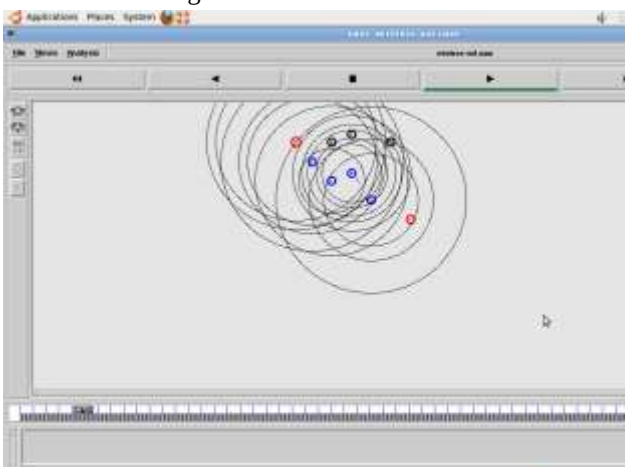

Fig 3 Route Discovery

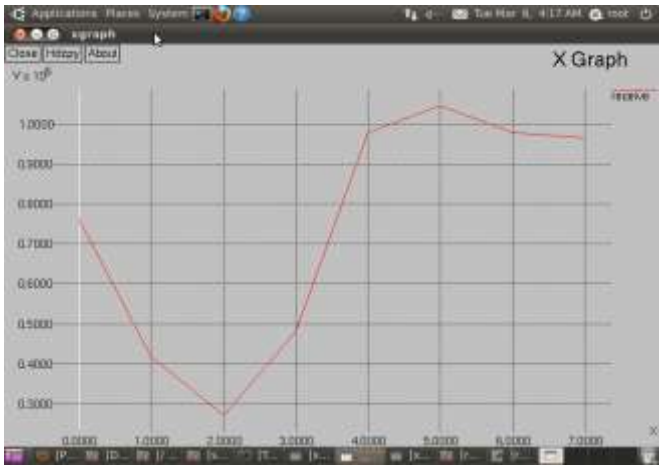


Fig 4 No Of packets send

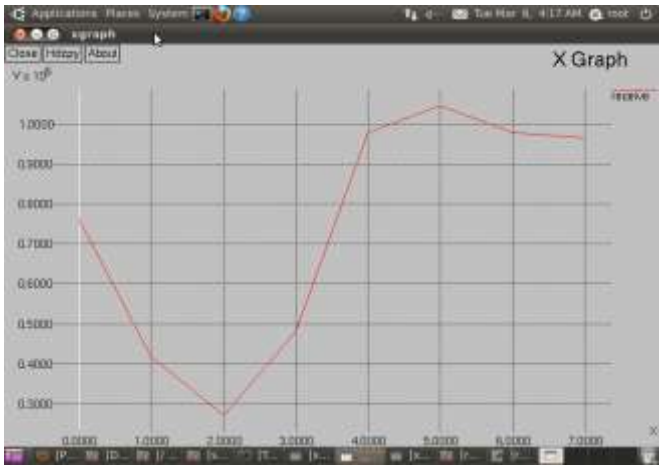


Fig 5 No Of packets send

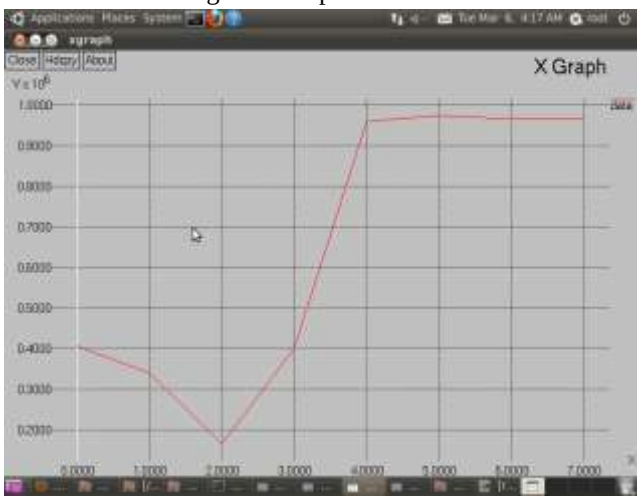


Fig 6 No of Packets received

## VI. CONCLUSION

The route identification by using AOMDV protocol is proposed in this paper. The path recovery technique is used to solve the problem of link failure. This link failure is caused due to movement of nodes; bad channel condition or packet collision. AOMDV designs many link disjoint and loop-free paths. The delay is improved by a factor of 2. It also reduces the routing overhead. The group head selection is done based on Fuzzy control logic technique.

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