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Hybrid Based Energy Efficient Wireless Sensor Network Routing Algorithm for Farmland

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ABSTRACT: Wireless Sensor Network (WSN) consist of a large number of small and low cost sensor nodes powered by small batteries and equipped with various sensing devices. Usually, for many applications, once a WSN is deployed, probably in an inhospitable terrain, it is expected to gather the required data for quite some time, say four years. Since each sensor node has limited energy, these nodes are usually put to sleep to conserve energy, and this helps to prolong the network lifetime. The proposed routing protocols do not consider energy of the nodes while selecting routes which leads to early exhaustion of nodes and partitioning of the network. This paper attempts to provide an energy aware routing algorithm and WSN system relative to the distance and link state performance of the algorithm. Result of system is analyzed with the help of graph. The proposed algorithm shows efficient energy utilization to increased network lifetime to farmland.

KEYWORDS: Energy efficient routing algorithm; Wireless Sensor Node; algorithm hops

I. INTRODUCTION

Wireless Sensor Networks (WSNs) consists of a collection of sensor based mote nodes which are based on hybrid energy sources.Nodes in WSN can communicate with each other and can transfer information from anywhere to sink node without restriction. This non-restricted architecture and easy deployment characteristics of WSN make them very popular and highly suitable for agriculture sector, emergencies, and natural disaster operations.

Nodes in WSN have hybrid energy supplyto prolong or maximize the network lifetime and fault tolerance. The energy consumption of each node varies according to its communication state: transmitting, receiving, listening or sleeping modes. Now day sensor system is working on the different energy mechanism to prolong the lifetime of the nodes. But combination of hybrid energy sources and routing algorithms with maximum hoping count and fault tolerance plays an important role in energy efficiency because routing algorithm will decide which node has to be selected for communication.

The main purpose of WSN energy efficient algorithm is to maximize the network lifetime and fault tolerance. These algorithms maximize the energy life time of each node and provide number of sources for data sending. Energy efficient algorithms and can be based on the two Mechanisms: i) Minimizing Distance ii) Minimizing time between node. The fault tolerance is based on two Broadcast Mechanisms: i) BTC phase-I ii) BTC Phase-II

II. RELATED WORK

In [1] authors used broadcast tree algorithm, each node can send one broadcast message form each node after deciding the node is internal or leaf node.In [2]Hope count differs protocol by protocol, e.g. EIGRP and OSPF. In [9] the soil sensor information, data compression algorithm and lethal cell sensor collect the sensing data related to soil and send to data server. In [10] provides data-centric routing approach where the data should be named using high level descriptors or metadata. In [11] a set of path is chosen based on probability. Value of probability depends on how low energy consumption of each path is the problems with this protocol are – complex addressing method &communicate overhead during the setup phase. In [12] Different power aware metrics can be used to increase energy efficiency such as minimize the energy consumed/packet, maximize time to network partition, minimize variance in node power levels, minimize cost/packet, minimize maximum node cost. Thus, rather than using traditional metrics such as hop count or

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delay for finding roots, it is important to use metrics. In [13] key idea in this approach is to route the queries to the nodes that have observed a particular event rather than flooding the entire network to retrieve information about the occurring events. In order to flood events through the network, the routing algorithm employs long-lived packets, called agents. When a node detects an event, it adds such event to its local table, called events table, and generates an agent. Agents travel the network in order to propagate information about local events to distant nodes. When a node generates a query for an event, the nodes that know the route, may respond to the query by inspecting its event table. Hence, there is no need to flood the whole network, which reduces the communication cost. In [12]energy saving scheme with sleep scheduling introduce sleep mode into the network, the total energy consumption of the network can be reduced and the network lifetime can be prolonged. The core idea is to employ probabilistic based sleep mode to decide whether or not a node should sleep for the next period. It is shown that with a certain value of gossip, sleep probability 'P' and under certain topology density, the network remains connected and thus works well. In [14] the logistic infection model used to compute infection index for downy mildew. In [15] the beta model used to calculate the temperature infection index.

III. LITERATURE SURVEY

A"A Survey on Sensor Networks"

Abstract: - For different application areas there are different technical issues that are solved in wireless sensor networks. Energy efficient root can be found based on available power in the node or energy required for transmission in the links along the root. The flexibility, fault tolerance, high sensing fidelity, low cost and rapid development characteristics of sensor network create much new and exciting application area for remote sensing.

B" Power-Aware Routing in Mobile Ad Hoc Networks"

Abstract:- Different power aware metrics can be used to increase energy efficiency such as minimize energy consumed/packet, Maximize time to networks partition, Minimize variance in node power level, Minimize cost/packet, Minimize maximum node cost. Thus rather than using traditional metrics such as hop count or delay for finding root it is important to use above metrics.

C" Gossip-based Sleep Protocol (GSP) for Energy Efficient Routing in wireless Ad Hoc Networks"

Abstract: -in this approach the core idea is shown that within certain value of gossip sleep probabilistic P and under certain topology density, the networks remains connected and thus work well.

D" Energy-efficient communication protocol for wireless micro sensor networks"

Abstract: - Route the queries to the node that particular event rather than flooding the entire network to retrieve information about the occurring events. When node detect an event, it adds such event to its local table called event table and generates and agent. Agent travels the information. Hence no need of flood the whole network which reduces the communication cost.

IV. SYSTEM ARCHITECTURE

The system architecture want to understand then deploy the WSN in practical area. With the help of this WSN system different information are collected centrally. In this proposed system the hybrid prototype model used. It made with mote which configure with different sensors capacity. The every mote is sending some information in packet format from source node to sink node so that the cluster build. The data are process in data centre and calculating the possible result.

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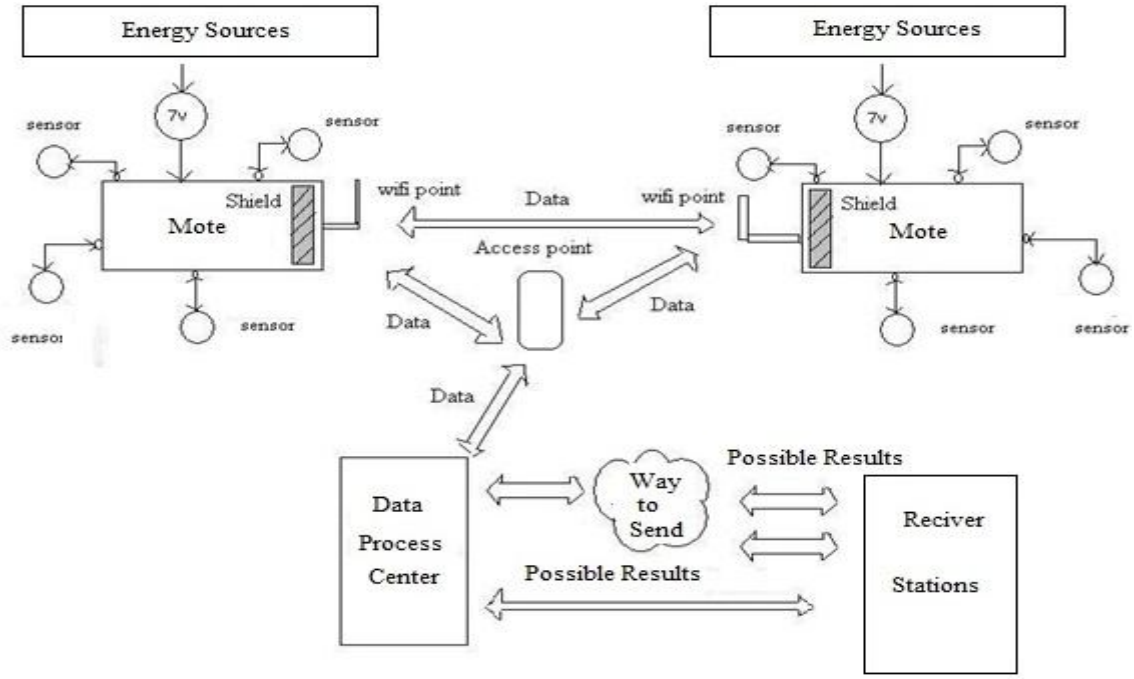

Fig1: System Architecture

In proposed system no of sensing device used for collecting different information. The processed data are compared with threshold values which is standard values.

V. SYSTEM WORKFLOW

The WSN system arranging different energy sources for prolonging the network life. Authentication used for security and confidentiality. Deploy the WSN system on field for data or information collection. Calculating the result and send to data centre for calculating possible results. Finally result is sending at received station this checked by acknowledge.

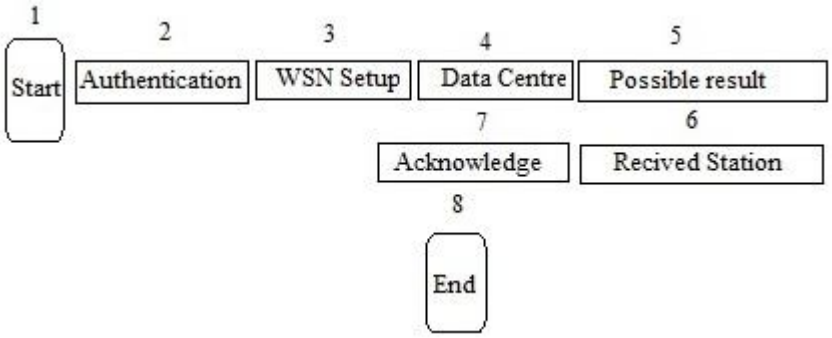

Fig2: System workflow

VI. PROPOSED ALGORITHM

A. *Description of the Proposed Algorithm:*

Aim of the proposed algorithm is: i) to calculate shortest path. ii) Faulttolerance

The proposed algorithm is consists of some main steps.

Step 1: Calculating shortest path:

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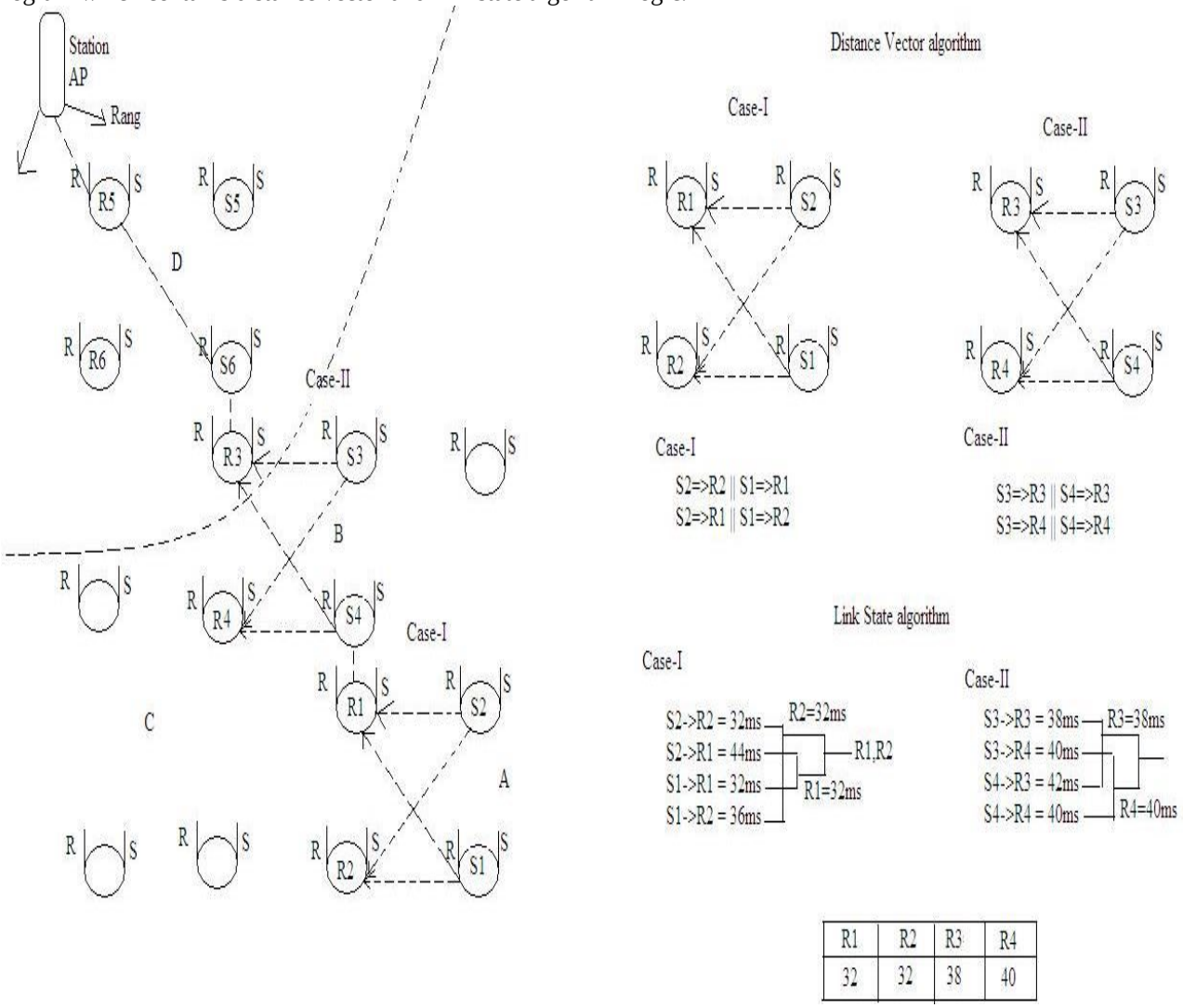
In routing algorithm module each sensor nodebuilds with distance vector and link state methods for calculating the shortest path. Distance vector protocol using OSPF (Open shortest path finder) calculates the nearest node and Link state protocol using EIGRP (Extended gateway routing protocol) calculates the minimum time required between the nearest node. For clustering every sensor node sends the data from one node to another node or cluster head node. The EIGRP (extended gateway routing protocol) hoping count is infinity and update time is 90 Sec and OSPF (open shortest path finder) hoping count is infinity and update time is 120 Sec. For data transmission or receiver from one sensor node to another sensor node or sensor node to cluster head node library header file is used in a program which contains distance vector and link state algorithm logic.



R1	R2	R3	R4
32	32	38	40

Fig3: Distance vector and Link state algorithm

Step 2: reduce the fault tolerance:

In this phase the information is sent from source node to sink node for this different parent node are searched. Every node acts as the parent and child of each other and connected to each other with its parent address. The every node is having the data filed and the address of its child and parent field. In communication if one path gets damaged, then with the help of broad tree construction algorithm logic, maintaining the alternative way for each node.

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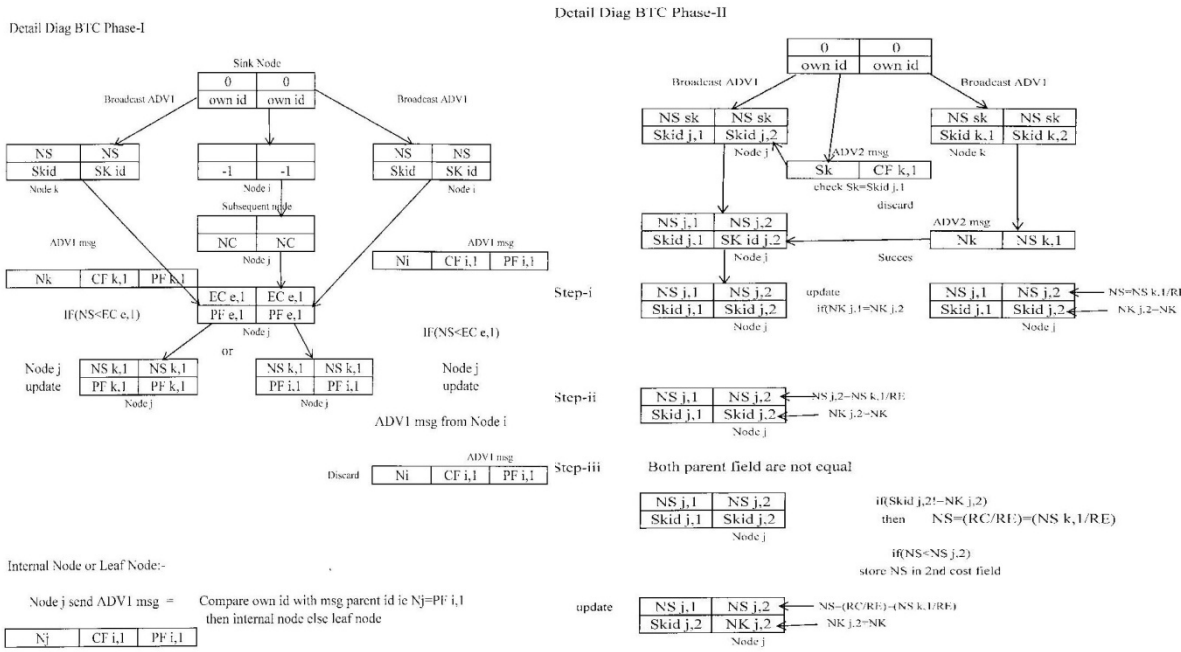

Fig4: Fault Tolerance Algorithm

VII. RESULTS ANALYSIS

In the result analysis WSN system will calculate the information from filed and transfer to data center for processing and calculating the possible results. System contains the 4 sensors based motes for different readings. Fig1 and fig2 shows the possible result or infection index values which is generated by system with common time and for common date.

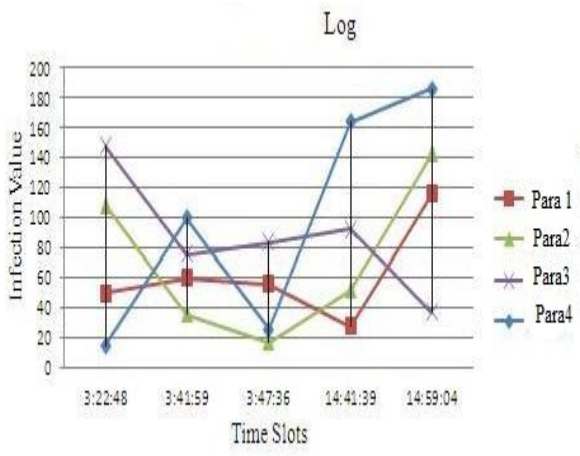

Fig5: Infection Index Network of 4 Nodes

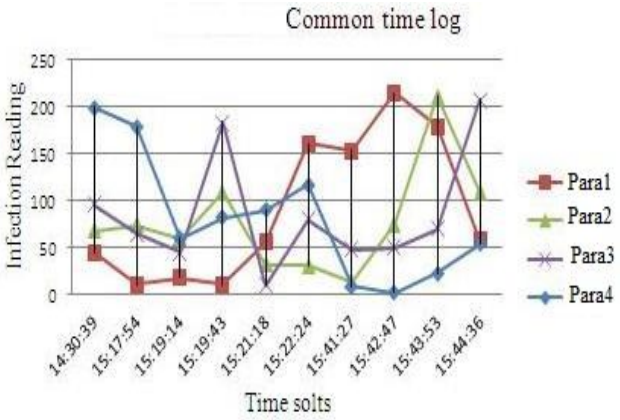

Fig.6: Infection Index of 4Nodes

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The Fig7 and Fig8 shows the variable result calculated in data centre with graphical modes. For this some software are used at data centre. Here individual graph will shows the one sensor node comparison value with infection index value.

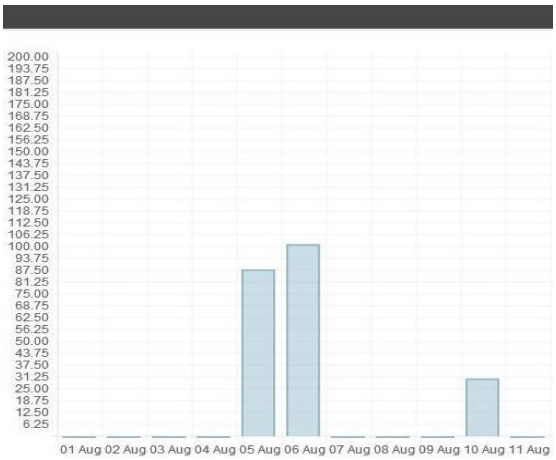

Fig.7: Software Infection Index Network of 4 Nodes

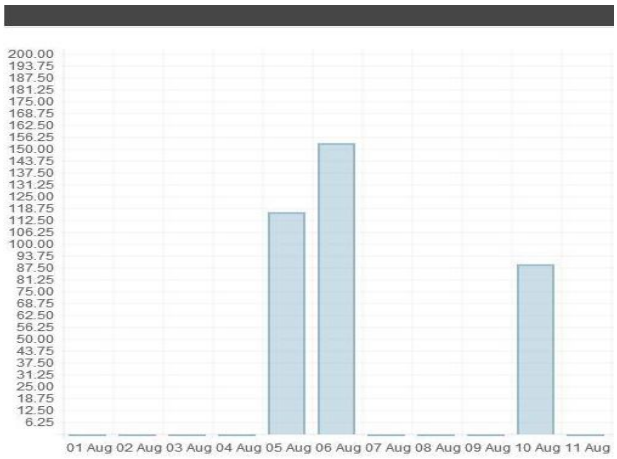

Fig 8:Software Infection Index Each Node

VIII. CONCLUSION AND FUTURE WORK

We present a WSN system in the field, and its application for farm in terms of different parameter. Today's farm situation are different, variation depends upon the place or distance as a result of it favourable situation is created for diseases. In this case wants to understand the accurate productivity and quality. The proposed WSN system provides a solid base for farmland for taking place the decision.

The proposed WSN system will give the innovative approach for sensor network, which will provide information in multiple ways to data centre and hybrid energy efficient modes of power supply.The proposed WSN system application provides the communication network of possible situations.

In this proposed work current system calculate the infection index value for each cluster, which is less accurate.The system provides hybrid energy mode but selectionof the modes for power supply is manual. With the address of this issue in future to develop software in micro level result calculation and auto energy selection modethis suggests the accurate situation of the farm. At data center sidesystem will store all types of information and it will analyze in depth with graphical structure.

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