



## Survey on Routing Algorithm

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**Abstract**— A wireless sensor network is a collection of sensor node for communicating with each other. Many routing algorithm and protocols are designed for energy saving in wireless sensor network where energy is considered as an important issue. Most importance is given to routing which varies with the network and the architecture of network. Routing algorithm are responsible for selecting the path and maintaining while transmitting of data packet from source to destination for wireless sensor network which will lead to reliable and efficient communication in less time. Energy saving has become the important goal for routing algorithm. In this paper we present a survey of different routing algorithm in WSN.

**Keywords**— Wireless sensor network, routing algorithm, Energy consumption

### I. INTRODUCTION

A wireless sensor network is a collection of small sensor node with sensing and communicating which helps in monitoring environmental condition. Sensor nodes are placed anywhere in the sensor field which will be area where all sensor nodes are deployed. Sensor node communicates with each other to produce large information about the environment [1]. Each of the sensor nodes placed in a sensor field has the capability to collect and route data towards other sensor nodes. Sensor node has finite energy source such as battery. Due to large number of deployment and unattended position of node battery replacement are not possible. Component that store energy are power storing components i.e. battery and capacity etc. Energy consumption is done by radio link of every node and it is analyzed by two topology i.e. equidistant hop and other space between nodes. Acquisition, communication and data processing are the function performs by sensors for energy consumption [2]. [3] Objective is to find out amount energy consumed by the node and increase the life time network. Energy and time consumption in WSN also depend on the construction of network topology. The process selecting the path in the network for transferring the data from source to destination through router is called routing and the device used is called router. There are many routing algorithm which aim for energy and time consumption. Till now the routing algorithm were finding smaller path for transferring data from source to destination algorithm by shortest path algorithm. Algorithm based on swarm intelligence was also used for routing purpose such as honeybee algorithm, termite routing algorithm [4]. Routing is the process of transferring the data packet from source to destination. More energy is consumed while transferring the data packet So many routing algorithms are introduced to overcome different energy related problem in various way.

Energy efficient is main constraint of WSN designing energy saving routing algorithm is necessary so energy aware in routing is design. [5] Proposed for a cluster based routing WSN here all sensor nodes are organization of distinct cluster select cluster head. Each cluster head will transfer the data packet from source to destination and here some amount of energy is consumed. [6] propose a decentralized hierarchical cluster based routing algorithm for WSN .It is used during construction of routing tree.[7] propose an approach of new multi objective for WSN routing problem that deal with the parameter such as delay through put etc sometime it may cause congestion in network.[8] propose some technique for balancing energy consumption among node and increase the lifetime of network.[9] propose a routing protocol aiming transmission of data by consuming less amount of energy and prolong lifetime of network.

### II. LITERATURE SURVEY

#### A. LEACH based Algorithm

Wendi Rabiner Heinzelman et al.[10] Distribution energy load among sensor node in the network. So LEACH was introduced as due to more energy consumption by cluster head will die. Here all node once become the cluster head and same amount of energy is used by every node in network. In LEACH election of cluster node is done periodically. Every cluster node is selected according to the energy it consists. After that cluster head broadcast a message in the network. Clusters are form dynamically for every count and data collection is made centralized. The operation of LEACH consists of two phase i.e. setup phase and steady phase were set up phase does the organisation of network into cluster and cluster head and steady phase does data aggregation, transmission and compression.

Mortaza Fahimi Khaton Abad et al. [11] LEACH the election was done on periodically. In case of poor topology at the time of single round .It will degrade the performance. To overcome the degradation problem LEACH –C algorithm is introduced the cluster head is elected centrally and these will lead to reduce energy consumption in every round of transmission.

Haosong Gou, et al. [12] proposed an improved LEACH algorithm call partition LEACH. In this algorithm the network partition is made into number sectors and the node is selected with highest amount of energy and that selected node is consider as head node. Partition based LEACH algorithm consist of two phase. At first the calculation of optimal number of cluster heads need for a network and partition of network in different sector is done. Secondly sink node select a node with high energy in the sector on the basis of information of cluster head.

### **B. Security based algorithm**

Lata BT et al.[13] Proposed SSEGR algorithm to reduced power consumption. This algorithm minimized the data traffic and energy consumption by single copy of data Here one copy is transferred to another node by greedy approach and another copy is kept in sending station. If the acknowledgment of getting the first copy is send. It uses geographic routing protocol that depends on information of geographic position.

Sai Zou et al.[14] Proposed delay tolerant algorithm is introduced based on the node selfishness. This algorithm is design to reduce the network communication and message transmission is improved. Firstly the area is divided into grid and secondly location of node is predicted and creditability of the node is estimated on the basis of node selfishness.

Yi Sun et.al [15] proposed chain routing algorithm based on traffic prediction. This algorithm use traffic prediction model for the process of election of LEADER node for the judgment. This algorithm will avoid premature death of LEADER node at the same time reconstruction of network topology. Thus it helps in prolonging network lifetime and energy consumption.

Asturias Diego et.al [16] proposed range routing algorithm to balance the energy consumption of sensor network. These algorithms consist of ART (Adjustable range transmission) which is develop for protecting network from energy holes. Here decision is based on location of node and destination node and also on the position of the neighbor node to forward message toward the destination. ART utilize the long hop routing for sending information to base station through a longer hop. This is done on the basis of position of node in WSN by adjusting the range of power.

Guangeong Liu et al. [17] Proposed adaptive dynamic algorithm to overcome the problem such as low data rate, balance energy it combines the plane and hierarchical routing. According to this algorithm the data query packet for sink node is made into two part i.e. single point query and multipoint query. This algorithm is proved for good transmission rate in the network balance energy and reliable for communication.

Previously Floyd Wars hall's algorithm was not used for routing in WSN but modification in Floyd War shall algorithm has enable it for using it in wireless sensor network. David Braginsky et.al [18] Proposed algorithm compute the shortest path available, it take the consideration as a directed graph and provide a acknowledgement of every path. This algorithm allow to obtain all possible shortest path from every node Floyd Warshall algorithm does not have secure data transmission in WSN, as it was not providing acknowledgement of data receipt. Advantage of this modified algorithm is that it accesses all possible shortest paths in the network and hand shaking has made transmission of data successful in network.

### **C. Energy efficient routing algorithms**

Wang et.al [25] proposed a energy efficient routing protocol where random deployment of node is done and sink are employed. The cluster head selection is done by stable election protocol based on energy of nodes and the data transmission done by the node. This protocol is used for balancing the energy of node and increasing network life.

Keshavary M et.al [19] proposed energy aware algorithm to prolong the lifetime of WSN. It is done with managing the time of nodes activity and managing the neighbour nodes between source and sink in communication path. The algorithm used here is flow augmentation algorithm. The purpose of this algorithm is to find best link the amount of energy require to transfer data unit from sender to receiver and also maximize the life time of network

Hamid Rafuri et.al [20] Proposed effective lifetime aware routing algorithm is used for reducing the node failure due to hardware failure or natural impact firstly the method is introduced which will determine the resource and number of nodes available according to their sensing spatial coverage. This paper helps in increasing lifetime and sensing coverage of the node in the network.

Pratyay Kuila et.al [21] Energy balanced distributed and routing algorithm consists of cost based energy balanced clustering and routing algorithm. The algorithm consist of three phase first is selection of cluster head set up cluster and data routing. Cluster head are selected on the basis of their energy residual and their neighbor energy level. In the set up phase the non cluster head join the cluster head according to the cost value of cluster head in their communication range. In data routing phase the algorithm first uses single hop within each cluster for communication and then multi hop. The cluster head goes on measuring the cost of path toward base station from it path towards base station from it and then select the other cluster head and forward it data through that path.

Harish Kumar et.al. [22] Proposed energy aware fishy routing algorithm reduction of energy consumption of the network by avoiding the problem of imbalance of energy and energy holes formation. This algorithm is used for path selection it select the path on the basis of energy rather than length of path. Energy of every node is compared for finding the node with more energy and then data packet is forward and this process is applied to every node.

### **D. Swarm Intelligence based algorithm**

Adam Mustala Zungun et al [24] proposed termite hill algorithm which is inspired from working of termite in nature termite go on depositing pheromone on the path and following that pheromone the other termite follow each other. Similarly data packets are transfer by termite algorithm from source to destination through pheromone deposition. The

main objective of this algorithm is efficiently forward the traffic to the destination for the sink and also helps in balancing network energy.

Alexandros Giagkos et al [23] proposed a swarmed intelligence routing protocol. It provide multiple path for routing in wireless sensor network. It work as the Bee work in the nature for searching their food source. It is an agent based routing in wireless ad hoc network. It consists of some rule which all the nodes in the network have to follow while performing routing. It help in fast transmission of data packets and use multiple path for transmission.

Rany Eltaras et.al [26] proposed Associative routing which is used to enable descriptive identification of network service and resource. Associative routing semantics free destination address with semantic rich destination which will combine the node at routing time. Node does not required id for their identification they are identified by their service and the resource they are provided. Associative routing has the advantage such as efficiency dynamic identification, anonymity.

**E. Other routing algorithm**

Hin Wang et al [27] proposed mobile sink routing algorithm it is related to energy and distance in wireless sensor network. Mobile sink node is used to increase energy efficiency of the sensor networks. First the selection of mobile sink node is made and the position is chosen from location determined by boundary nodes and transmission range. Relay nodes are elected according to the link cost to make sure of complete and correct forwarding of data.

Yi Zhang et.al [28] Proposed self adaptive routing algorithm to overcome the problem of energy consumption. This algorithm helps in transmitting data through different path to the various network environments. It is more efficient towards network reliability, network latency. It also meet different requirement of QoS by setting different parameter values. It helps in maximize life of network.

Meikang Qin et al. [29] proposed informer routing for fault tolerance in WSN. Where non cluster head select a few number of target for transmission. In this routing technique non cluster head are able to find their cluster head IHR routing protocol aim to save energy in network.

Linliary Zhao et al [30] proposed flooding and directed diffusion algorithm to calculate the node hop and a data packet transmission. As flooding needs the message to be broadcasted but it will required more power for flooding of message. It will lead to short network time by using flooding and directed diffusion routing algorithm the range of broadcasting message can be controlled.

Table I Table of Different Routng Algorithms

Algorithm	Technique	Protocol	Goal
Flooding and Directed Diffusion	Calculate node hop for data transmission	Flooding prtocol	Energy Consumption
Rumor Routing	Query transmission	Query driven protocol	Energy Consumption
LEACH algorithm	Forming cluster and cluster head	LEACH protocol	Energy Consumption
Modify LEACH-C	Election of cluster head is centralised	LEACH protocol	Energy Consumption
P-LEACH	Partition ikf network for electing CH	LEACH protocol	Energy Consumption
Associative Routing	Node is known by service and resource it had	Address based protocol	Energy Consumption
SSEGR	Single copy of data is transfer	Geographic protocol	Energy Consumption
Chain routing algorithm	Traffic prediction model Is used	Chain based protocol	Energy Consumption
ELAR	Sensing spatial coverage method	Conventional Ad hoc protocol	Energy Consumption
ADHRA	Data query drive	Event driven protocol	Energy Consumption
DCR	Cluster head join non cluster node according to cost value of energy	MAC protocol	Energy Consumption
Modification of FWA	Shortest path is taken node from every n	Handshaking protocol	Energy Consumption
DT	Estimate node selfishness	DTSNS protocol	Energy Consumption
SARA	Data transferred through different path	SARA protocol	Energy Consumption
FR	Path is selected on the basis of node energy	FSR protocol	Energy Consumption
BEE algorithm	Working of BEE in nature	BEEIP Protocol	Energy Consumption

Termite Algorithm	Working of termite in nature	Termite protocol	Energy Consumption
IHR Algorithm	Few number of target for transmission are selected	IHR protocol	Energy Consumption

### III. CONCLUSIONS

In this research paper concentration is made on the comparative study of routing algorithm performance. The researches has shown that routing algorithm remove some problem related to battery life, data transmission in network etc. This all algorithm are design for increasing the life time of nodes in wireless sensor network.

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