IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 6, June 2015.
www.ijiset.com
ISSN 2348 – 7968

An Energy Effective Minimum Hop Routing Scheme to Improve WSN

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Abstract:-

To optimize the QoS for sensor network, it is required to improve the communication over the network. In this work, an effective routing scheme is defined to improve the network communication and to improve the network life. The proposed approach will identify the next neighbor based on the maximum distance in coverage range of node. Because of this approach, numbers of intermediate nodes are reduced and the overall energy consumption over the network gets reduced. *It improves the network life and communication.*

Keywords: **-WSN, Routing, QoS, Intermediate Nodes, Effective Routing**

Guide name

INTRODUCTION

Wireless sensor networks have become increasingly popular in the computing and communication industries, since their emergence in the ‘70s. There are two variations of mobile wireless networks [1] - the first is known as infrastructure network, i.e., a network with fixed and wired gateways and the second is infrastructure-less mobile network, better known as an ad hoc network. Wireless networks are gaining popularity to its peak today, as the user wants wireless connectivity irrespective of their geographic position. Wireless sensor Network enable users to communicate and transfer data with each other without any wired medium between them. One of the reasons of the popularity of these networks is widely penetration of wireless devices. Wireless applications and devices mainly emphasize on Wireless Local Area Networks (WLANs). This has mainly two modes of operations, i.e. in the presence of Control Module (CM) also known as Base Stations and Ad-Hoc connectivity where there is no Control Module [2]. Ad-Hoc networks do not depend on fixed infrastructure in order to carry out their operations. The operation mode of such network is stand alone, or may be attached with one or multiple points to provide internet and connectivity to cellular networks. These networks exhibits the

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same conventional problems of wireless communications i.e. WSN width limitations, battery power, enhancement of transmission quality and coverage problems [5].

In WSNs, each sensor node has various sensors depending on the WSN application. Each sensor nodes is able to perform the communication under energy constraint. It means each participating nodes gives some energy loss. This loss depends on the role of the node or multi-hop in communication. A communicating node gives different level of energy loss based on the operation such as transmission of data, receiving, forwarding or aggregating data. The communication in such network can be single hop. The data transmitted from these nodes is collected by the base station. This connectivity network can also include laptop, PC or PDA as seen in Figure 1.1. Senor network is defined with 3 main components :

- Node itself that sense the environment or the resource
- Another component is process component to perform the communication
- Communication components are responsible for the information exchange.

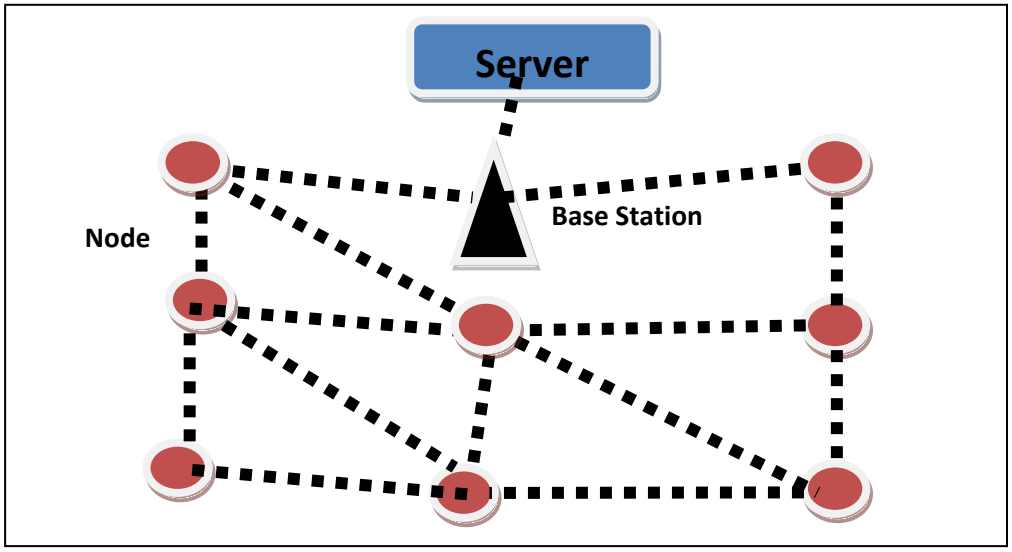

Figure 1: Wireless Sensor Network

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LITERATURE SURVEY

J. Jobin (2005) has defined a effective data transmission scheme to handle communication in sensor network. Author defined a work to provide effective communication while analyzing the communication WSN width and the energy specification.

Atul Bari has defined an effective route communication so that the network life will be improved. Author defined the communication network to handle communication over the network. Author has defined the effective balanced data gathering to perform data transmission under range, connectivity, fault effectiveness and power aware communication.

Yean-Fu Wen (2007) has defined an effective data aggregation specific routing in communication network. Author has defined a effective scheduled routing in clustered sensor network. Author defined the battery capacity analysis and energy effective communication in sensor network. Author has defined the energy effective communication for power range communication. Author has estimated the energy consumption over the network. Author has defined the effective cluster construction and data construction for effective aggregative routing.

Yu Gu (2007) has defined effective scheduling mechanism to improve the routing in surveillance based communication network. Author defined the routing to improve the network lifetime and coverage so that network effectiveness will be improved.

Saeyoung Ahn (2008) has defined a scheduling specification routing for Zigbee effective slotted network. Author defined an effective communication routing scheme under power consumption so that the network communication issues will be resolved. Author has defined an effective clustered routing under multi-hop communication network. Author has defined the zigbee effective communication in restricted communication network. The work is here defined to achieve the stability and synchronization. The Zigbee based communication is multi hop short distance communication so that the network communication over the network will be improved. Author defined the scheduling scheme under low power consumption and communication analysis so that the network life is improved. Author has defined a tree topology specification communication effective network has improved communication over the network.

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Yavuz Bogaç Turkogullari (2008) has defined effective node localization, scheduling and routing solution in communication sensor network. Author has discussed the coverage problem in heterogeneous sensor network with finite planned communication in effective time interval. Author has defined the work under activity scheduling to perform effective deployment of nodes and to provide the sensor to sink based path under energy and budget constraints. Author improved the network life under integer linear programming so that the network life is improved.

Vinay Joseph (2009) has defined an effective power effective scheduling and routing under multipath scheduling and energy effective routing. Author has defined multicast communication routing in sensor network. Author improved the broadcasting over the network with performance improvement. Author has defined suboptimal algorithm under the performance study.

D.Baghyalakshmi (2010) has presented an energy effective and latency specific communication routing in sensor network. Author has defined the communication under effective network deployment and fault tolerance so that the effective energy efficient communication will be drawn. Author has defined the work to reduce the energy consumption and to improve the network life. Author has defined a fualt tolerance specific routing under energy efficient communication. Author has defined the scalability, latency specific communication so that the effective network communication will be drawn. Author has defined a time critical communication under low latency and energy effectiveness. Author defined the work for energy specific communication for data sensing communication. Author has improved the communication for hybrid communication network.

Jiann-Liang Chen (2010) has defined an adaptive route generation for sensor network. Author has improved the communication under proactive, reactive and hybrid routing. Author defined the routing under communication network and to improve the communication over the network. Author has defined an adaptive routing protocol for redundancy communication with effective route generation for network. Author improved the simulation by effective communication route generation.

Amulya Ratna Swain (2010) has defined an energy effective route generation in sensor network. Author has defined the battery effective communication in sensor network. Author defined work under restrictions of node deployment. Author has defined the energy limited

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routing to conserve the energy and to improve network life. Author has defined two main energy effective scheduling approach called random communication and synchronized communication. Author has defined a sleep scheduling scheme to generate route between two ends. Author has defined a new protocol to generate route under tree specification analysis and scheduling mechanism so that the energy effective balanced communication is drawn over the network. Author defined the fault tolerant communication in sensor network. Author presented a energy effective communication so that the network life will be improved and the performance of network will be adaptive.

Yuanyuan Zeng (2010) has defined a real time communication routing for effective power aware scheduling. Author improves the communication over the sensor network for real time communication. Author handle the associated problems such as coverage range problem, delivery fault etc. Author improved the TDMA scheduling along with effective route generation.

Feng Liu (2010) has defined an effective communication routing and scheduling so that the network life will be improved. Author has defined the power effective communication so that the energy effective network communication. Author has defined the periodic communication in sensor network so that the sleep scheduling scheme and deployment of sensor network will be improved. Author defined the effective packet delivery with effective scheduled routing in sensor network.

Qian Ye (2010) has defined an effective multipath routing in multimedia sensor network. Author defined a disjoint path communication routing. Author defined the work to deliver the multimedia traffic in communication. Author defined the disjoint multipath routing in sensor network. Author defined the packet communication and its classification. Author improved the real time communication and reliable communication under priority specific scheduling model. Author defined the traffic aware routing and scheduling so that the simulation results will be effective.

Ajinkya Kher (2010) has defined an effective routing schedule with communication delay in sensor network. Author defined the energy effective communication in sensor network. Author defined the work to improve the duty cycle and to improve the transmission under defined range. Author has presented the minimum delay effective communication in sensor network so that the

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commutation in the network is reduced. Author defined the topology specific communication in sensor network. Author defined two main scheduling algorithm to reduce the communication delay and to improve the network life. Author has defined the communication under delay parameters and the performance parameters. Author has defined the effective communication over the network.

Zhe Zang (2011) has defined effective route generation in sensor network. Author improved the routing under their liability and low cost communication in sensor network. Author defined hop effective communication so that the reliable communication will be drawn. Author improves the hop effective routing policy so that the effective route quality will be improved.

Jinbao Li (2011) has defined channel specific multi parameter specific routing in sensor network. Author defined the power control effective routing under optimal route generation and to handle the opportunities to reduce the communication loss. Author defined the performance effective routing in sensor network.

Shuguang Xiong (2012) has defined an effective routing in sensor network for structured communication. Author defined the sensor deployment specific communication in sensor network. Author defined the work to perform effective deployment of nodes and network.

M. M. Chandane (2012) has defined a quality aware routing in sensor network. Author defined the communication for effective route generation so that the route optimization will be achieved. Author defined the multipath fading over the network. Author defined a path analysis approach for energy effective route generation.

Chunsheng Zhu (2012) has defined the geographic routing in scheduled routing in sensor network. Author defined the potential routing scheme so that the scalability and efficiency is the effective routing constraints. Author defined the energy effective communication in sensor network under geographic forwarding scheme. Author defined two phase routing approach to improve the communication.

Ming-Shing Kuo (2012) has defined an opportunistic routing over the sensor network. Author defined a challenging framework to improve the network communication in sensor network.

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Author improved the route generation and optimization. Author has reduced the energy consumption and generate effective route.

Amir Hossein Mohajerzadeh (2012) has presented an optimal routing approach in sensor network under energy specification analysis and optimal route generation. Author defined a quantize mechanism for effective route generation.

PROBLEM DEFINITION

Energy and efficiency are always the main concern in wireless Mobile network. A mobile network contains huge amount of data transmission over the network. Because of this, there are more chances of data loss over the network. Our work is defined in same area. We proposed an algorithm to get the efficiency as well as the reliability. In this work an efficient maximally covered mobile network algorithm is presented such that addresses the requirements of power efficient infrastructure issues for WSN [5]. In this work we have combined the Path Selection Routing along with the concept of Energy Preserving. The initial route will be identified by the Path Selection algorithm and in case of any broken link or energy hole in the path it will look for the Alternate path using Energy Preserving [6].

RESEARCH METHODOLOGY

In Ad-hoc network distance is the major factor respective to which routing algorithms [6]. But

In this presented work we have considered multiple parameters to identify the right

Communication path. The parameters included in this work are:

- Distance
- Energy
- Maximum Coverage Range

Based on these all vectors the reliable and efficient communication path will be generated and that path will be taken as the main routing path on which the communication will be performed [10]. As the algorithm begins, the source and the destination nodes are specified explicitly between which the communication path will be generated. Now it will send the request to the source node and the wait is performed for the reply. As the reply is obtained it signify the right

communication can be taken place. Now to perform the effective communication between the source and the destination the effective parameters are required to identify for each neighbor node of current node[11].

Now to perform the effective communication we need to find the next effective neighbor over which the communication will be performed. In this work, the parametric analysis is performed on each node to identify the best neighbor. The parameters considered here are the distance, energy, delay analysis on each node. In the simple form, a minimum distance neighbor is considered as the effective next node. But in this work, the maximum distance node within the coverage range with maximum energy is considered as next effective node. Set this node as the best neighbor and the communication will be performed over that node. The process is repeated till the destination node is not arrived.

Parameters Used:

- Energy
- Distance

In this present work we have improve the path selection algorithm by using the concept of Ant colony optimization. The first step is to setup the network with specific parameters. These parameters includes

I. **Energy:** As each node in the communication is a sensor node, because of this each node is defined with specific energy we have defined 5 Jule to each node. With each communication over the network some energy is lost. If the energy is less then minimum required energy or 0 the node will be dead itself.

II. **Distance:** It is the actual taken to perform the communication over the network.

RESULT AND ANALYSIS

The presented work is implemented in MATLAB environment. The proposed work is about to find the optimal solution of any broken link or data loss in a high speed Sensor network. The

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proposed work is about the generation of such an approach that will dynamically compensate the problem of link failure and provide the optimize solution without any data loss. The proposed system will give the benefit in terms of Efficiency and accuracy. The network is designed with some defined parameters given as:-

Parameter	Values
Numbers of node	14
Area	500*500
Topology	FIXED
Initial energy	1J
Transmission energy	50Nj
Receiving	50nJ
Forwarding energy	10nJ

Analysis Parameters

Parameter	Value
Source Node	1
Destination Node	7
Energy	Random
Position	Fixed

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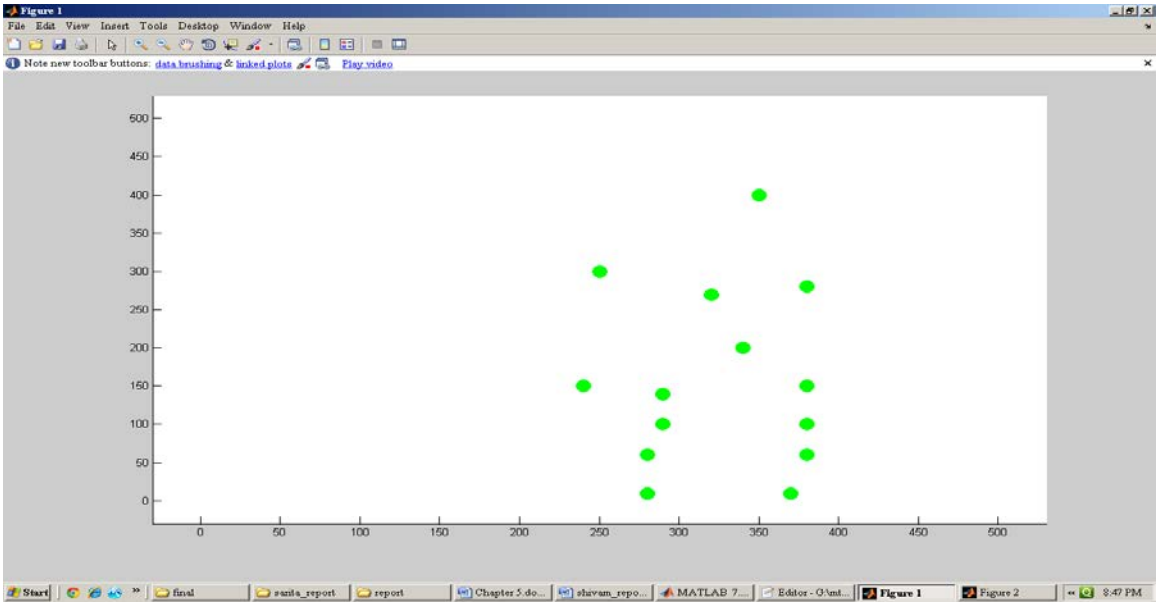

Figure 3: Network Architecture

In figure 3 we can see that the network is defined with 14 number of nodes. As we can see the nodes are defined under the positional vector respective to sensor area network.

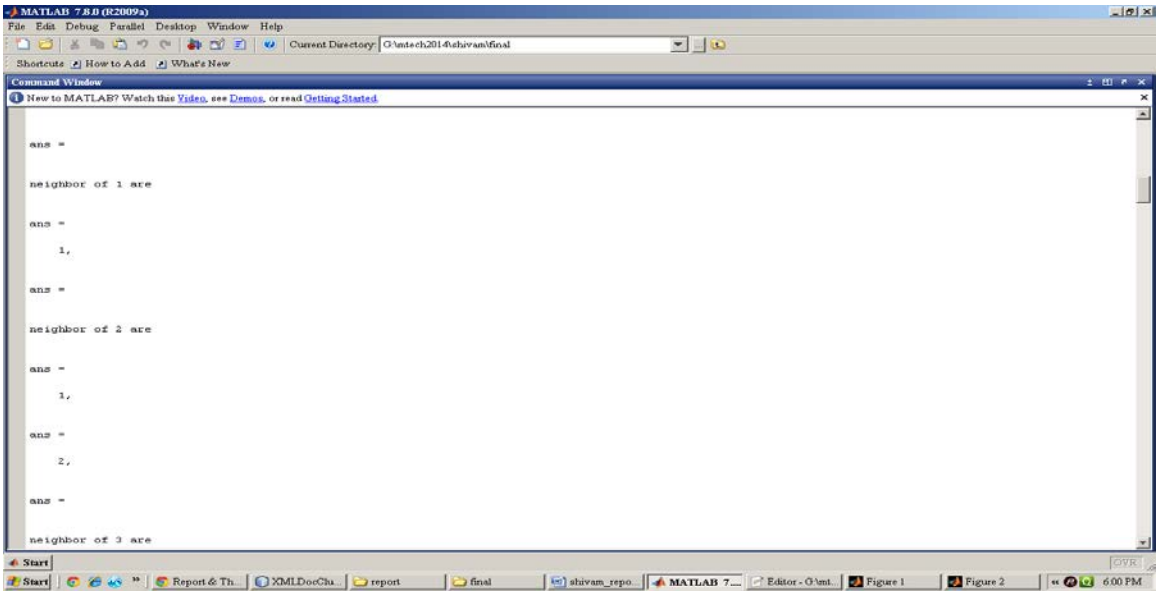

Figure 4: Neighbor Node Analysis

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Here figure 4 is showing the neighbor node analysis. The neighor nodes are identified based on the sensing range. If some active node is present within sensing range it will be considered as the neighbor node.

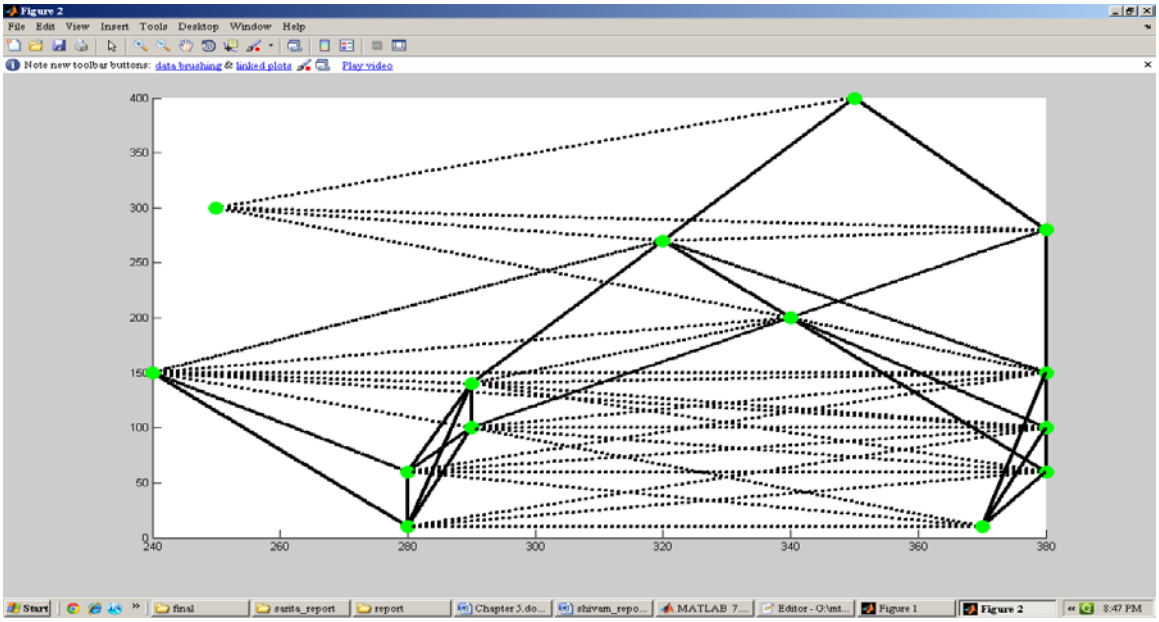

Figure 5: Network Connectivity

Here figure 5 is showing the connectivity between nodes under the sensing range specification.

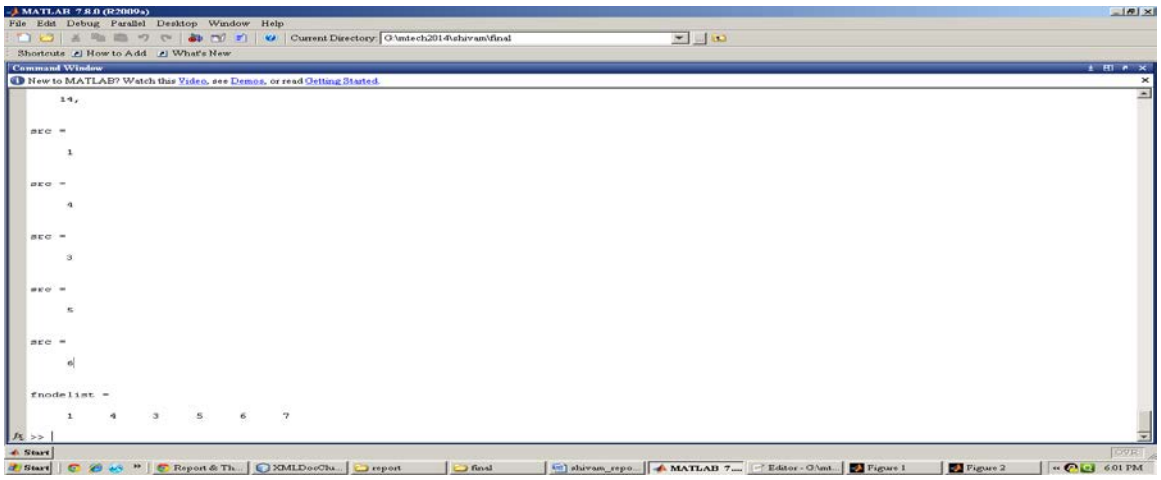

Figure 6: Generated Path (Existing Approach)

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Here figure 6 is showing the generated path over the sensor area network. The path is generated based on the energy, distance. The work is about to perform the selection of effective energy node.

The results obtained from the work are given here under

1 => 4 => 2 => 5 => 13 => 7

The energy consumption is estimated as

Table: Energy Consumption over the Path

Node NO	Type	Energy Consumed
1	Source	50nJ
4	Intermediate	10nJ
2	Intermediate	10nJ
5	Intermediate	10nJ
13	Intermediate	10nJ
7	Destination	50nJ

Total energy consumption over the path is 140 nJ

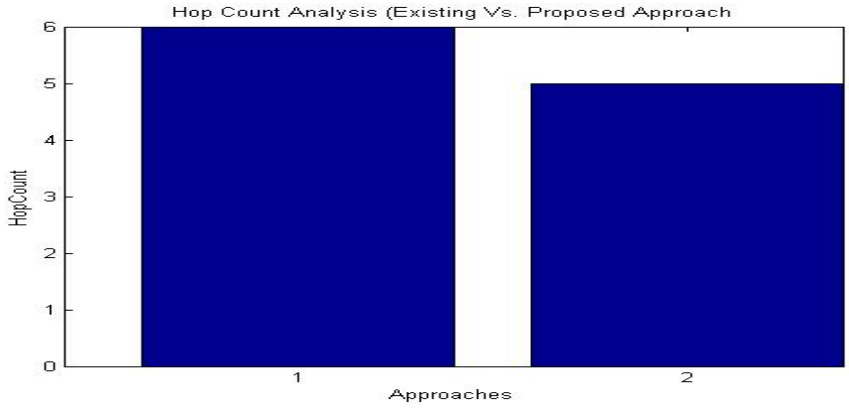

Figure 7 : Hop Count Analysis (Existing Vs. Proposed Approach

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Here figure 7 is showing the hop count analysis of existing and proposed approach. As shown in the figure, the proposed work has reduced the number of intermediate nodes. It will reduce the energy consumption and improve the network life.

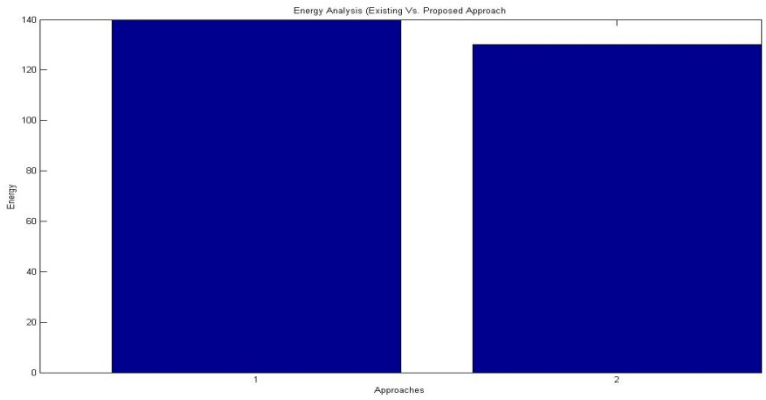

Figure 8: Energy Consumption Analysis (Existing Vs. Proposed Approach)

Here figure 8 is showing the energy consumption analysis of existing and proposed approach. As shown in the figure, the proposed work has reduced the energy consumption over the network.

The results obtained from the work are given here under nodes

1 => 2 => 5 => 9 => 7

The energy consumption is estimated as

Table: Energy Consumption over the Path

Node NO	Type	Energy Consumed
1	Source	50nJ
2	Intermediate	10nJ
5	Intermediate	10nJ
9	Intermediate	10nJ
7	Destination	50nJ

Total energy consumption over the path is 130 Nj

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CONCLUSION AND FUTURE WORK

Conclusion

In this proposed work we have defined a minimum hop energy effective communication path over the sensor area network. The work is defined for sensor area network with fixed placement of network nodes. These nodes are defined at fixed position and with energy specification. The work has presented a multiple parameters based approach to generate the effective communication path with minimum number of hops over the hops over the route. The parameters considered in this work are energy, sensing range and the distance parameters. The work is about to generate a path that will use minimum number of intermediate nodes so that the energy consumption over the route is reduced. The result shows that the energy consumption over the route is reduced.

Future Work

In this, the complete work is performed under the energy constraint. It this work we have resolved the energy consumption problem in a sensor area network by considering the minimum hop path over the network. The improvement to the work can be done in different direction [12].

- In this work, the type of data communicating over the network is not considered but in future type of data can also considered.

- In this work, the nodes are defined as normal sensor nodes. But in future, smart sensors can also be used.

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