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Energy Efficient Routing and Reliable Data Transmission Protocol in WSN

Osamah Ibrahim Khalaf[1] and Ghaida Muttashar Abdulsahib[2]

[1]AI-Nahrain University, Al-Nahrain Nanorenewable Energy Research Centre (NNERC) , Baghdad, Iraq.
e-mail: usama.ibrahem@coienahrain.edu.iq; usama81818@yahoo.com
[2]University of Technology-Iraq, Department of Computer Engineering, Baghdad, Iraq.
e-mail: gh961@yahoo.com, 30834@uotechnology.edu.iq

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Abstract

The wireless sensor nodes communicate next to one another by wireless techniques, and routing algorithms handle the sensor devices. The minimal resources and unpredictable low power links between the sink node make it challenging to create a robust routing protocol. We introduce a different Energy Efficient Routing (HEESR) in this article. This study outlines the design of the core network in real-time with WSN-based fixed slot assignments. It has find how the transferring of data had been further reduced by combing information about the direct link of singleway routing and multi way routing in Wireless Sensor Network. In this research, we enforced a protocol in the adopted in this research and the usefulness of the WSN protocol.

Keywords: *Wireless Sensor Network, Routing, Energy Efficiency, Sensor Node.*

1 Introduction

New improvements in the wireless infrastructures sector have contributed significantly to the development of low-cost equipment called sensor nodes or motes that can be relayed via radio waves and work together to achieve a Wireless Sensor Network (WSN). WSNs involve peer-configured, distributed and self-contained Sensor Nodes (SN) that mostly monitor moisture, temperature and sound environmental or physical activities in a particular application. The biggest challenge in WSNs is the reliability of the sensors because thousands of SN batteries implemented in a remote location cannot be replaced or powered up. In both computational operations of the SNs and communication protocols, therefore, energy-efficient methods must be deployed. Data aggregation and routing are two useful techniques, allowing the energy consumption of WSNs to be significantly decreased by minimising redundancy and infrastructure costs communication.

The reason is returned to the cause which show that 78% of the total power consuming in the sensor hops is create available by transmission of data , routing protocols has a great role in usage of energy. It is one of the purposes of how it is that energy-efficient protocols are thoroughly developed and applied at WSNs. In many WSN applications, data communication is a significant issue. Thus, it is useful to establish and develop easily obtained with the proper use of resources in order to provide data in WSNs. In this paper, we recommend a WSNs-based routing protocol.

WSNs are often considered to be comparably unreliable mainly due to three facts:

1. The design of simulation solutions can be used to assess the life of a single route and mobile sink multi-path routing protocols to minimise cost and improve the network life.
2. This contribution addresses the issues of unequal clustering in WSNs. It proposes a Energy Efficient Routing (HEESR) for wireless sensor network.

2 Related Works

The low-cost wireless network creates new sensor network potential outcomes, and the field of application of WSNs is continuing to overgrow. Sensors are always around today. Although WSN research will be conducted in the 1980s, academia and industry have been demonstrating a more significant role since 2001. The WSN market is projected to grow over $2 billion in 2021, according to recent studies. It is because small, low-cost and low-power sensors are easily accessible. Smart devices can be seen as the primary motivating power as it helps to enhance the operational MEMS markets by over 60%.

Authors have explored a protocol on the route discovery of energy efficiency clustering. It is a multi-hop algorithm which focuses on resourceful clustering by suitable choice of CHs in WSN. The CH is identified constructed on standards such as residual energy and communication costs within the cluster. It is a highly decentralised method of clustering and uses a complete network-wide CH transmission. Communication channels between CHs and the base station are multi-hop. That being said, more CHs are created than predicted, and the performance of the network is significantly lowered.

The author formulates a method for creating an optimal clustering design. As the new head of cluster, the hop with highest energy claims. The cluster head then receives all information from its neighbouring nodes and sends it to the sink. The group head with the maximum residual energy is chosen. The clustering algorithm was configured to protect a sensor zone to reduce energy usage per cluster.

The energy usage standard deviation among the clusters is also essential. Although this works well with a large number of nodes as a dynamic data protocol, its energy demand for collecting information on remaining energy from the surrounding nodes is considerable.

The network must balance energy and data performance when broadcasting data to the sink node in the QoS sensor networks. In route discovery, the SAR Protocol proposed the possibility of QoS. The SAR decides by three measures: energy of the node, data level and type of priority and performance of the link. The sensor nodes use distinct methods of information processing when the data is flooded in the networks. Processing of data can be accurate in WSN protocols, where data has been sent to the time-tamping aggregator node and the removal of all redundant data. That being said, nodes process the data locally in non-coherent protocols, before another information is exchanged to the sink-node.

3 Proposed Energy Efficient Routing (HEESR)

This approach involves the protocol to create and maintain multiple paths for all SNs in a Energy Efficient Routing protocol so the node could send information to the Base station. HEESR protocol, which utilises a better energy routing technology to enhance the lifetime of the network. Several measures, like MAC, the primary exchange mechanism, are strongly connected to the suggested routing protocol, which intends at providing a strong channel between two nodes and to reduce the essential issues. A sensor node monitoring system to preserve the compromise node attack in HEESR is also recommended. Hardware is used to evaluate overhead and setup time. The outcomes are also measured in a simulator and compared with the existing routing systems.

The following are some key advantages of the HEESR protocol proposed:

i) It uses the local and global information about the network configuration to introduce an energy-balanced route selection method and needs to be extended the communication range of multiple disconnected routes to increase network confidence.

ii) The routing framework enforces a trying to coordinate communications network, order to enable the compromise network nodes to be successfully accepted.

4 Processor of HEESR

To carry out the initial network topology, our proposed approach base for the first round is based on the random clustering methodology, and the clustering method is used for the next rounds. Our proposed protocol comprises two critical phases (Figure 1):

4.1. Phase I:

The aim is separated into two subjects for our proposed method. The first purpose is to build an effective process for selecting the optimal clusters. Secondly, the best configuration to use minimum resources is accessible. CHs are selected randomly for the first round (Round=1)[14][15][16]. The setup then takes place within the framework of cluster formation and then calculates the health of the cluster (Hi) BS is used to calculate the healthy function of the configuration (Hj).

4.2. Phase II:

The transmission of aggregate data sensor node data from CHs to the BS is carried out and the results. On the basic principle of the TDMA scheduling system time slot participants' nodes in each cluster will move their sensed information to their defined controls, transmitting it to the BS via relay nodes (CHs) and shut down in TDMA until after the next time spent. If an isolated node exists, it will send its data to a database station attempting to cover that this whole communications system.

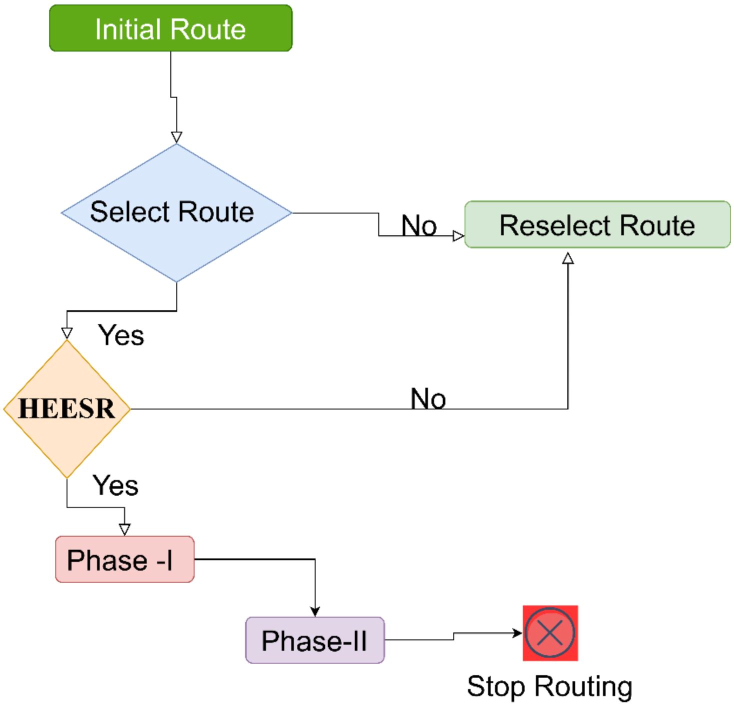

Figure 1: Flowchart of HEESR

5 Result and Discussion

In order to confirm the results of the model analysis, we should use the approach developed in MATLAB. For each case, the average performance evaluation contains 50 nodes randomly deployed within a 100x100 (m2), and 100 investigations are expected to perform for simulation studies. For all SNs, the energy level is 1.75 kilowatts, and the available bandwidth is only 10 metres. The broadcast packets and packet forwarding size is 50 bytes and 250 bytes. In the last part, usage of energy is set to (50 nJ / bit and 10) pJ / bit / m2 by transmission electronics and constant amplifier features. First, after the simulation runs for 1000 rounds, we calculate the remaining life of SNs located in different rectangles. Each SN sends a data packet to the BS in each round.

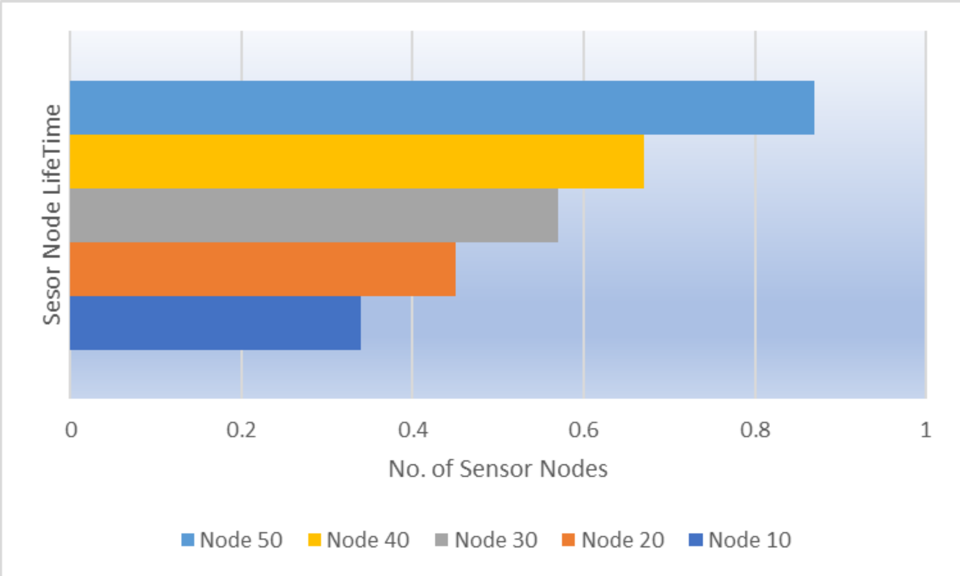

Figure 2: Lifetime of sensors at various locations

The nodes near the BS have a deficient energy level compared to the nodes in isolated regions, seen in Figure 2. With the increase in the path length, the remaining life of SNs increases. The improvement in the life span of all SNs at different locations, that being said, is not predictable. The possible explanation is that owing to massive network access and collisions, the SNs directly in the middle in the network area require more energy compared to right on the border. The study also indicates that the closer the SN is to the BS, the less energy but that would have. Consequently, the results from the simulation prove that the scientific system is accurate.

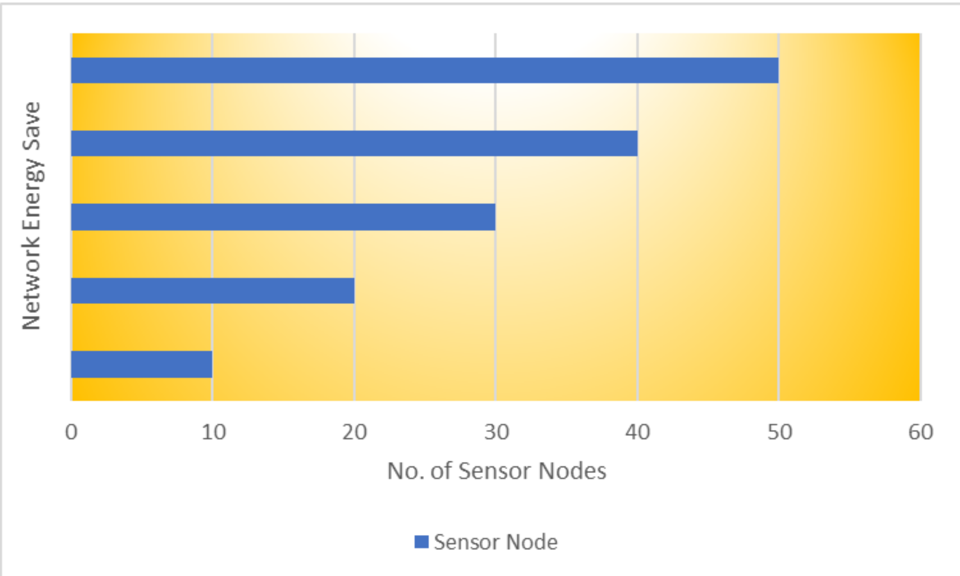

Figure 3: Remaining energy of the network

Figure 3 shows the simulated of the network's power consumption after 100 rounds. The energy output the network has after sending or receiving packets of data for a sequence of rounds is the energy remaining. The energy consumed of BS (0,0) at (50, 50) is shown to be greater than the return of BS until 3 nodes are energy-efficient. Since packets travel a considerable time towards the BS, the coverage and distribution of data packets use a significant amount of energy.

That being said, afterwards when the remaining of BS energy is nearly doubled (0,0), and the impact for the rest of both the dead nodes is continued. When more knots exhaust the battery, the network is divided and, while its energy is acceptable, many SNs cannot connect with the BS. Instead, SNs keep it alive and consume more energy when the BS lies at the centre. Thus, topology with the BS in the core uses node energy more effectively than (0, 0) in the long term. Trying to take BS into the centre requires continued the network life with computation and overall efficiency.

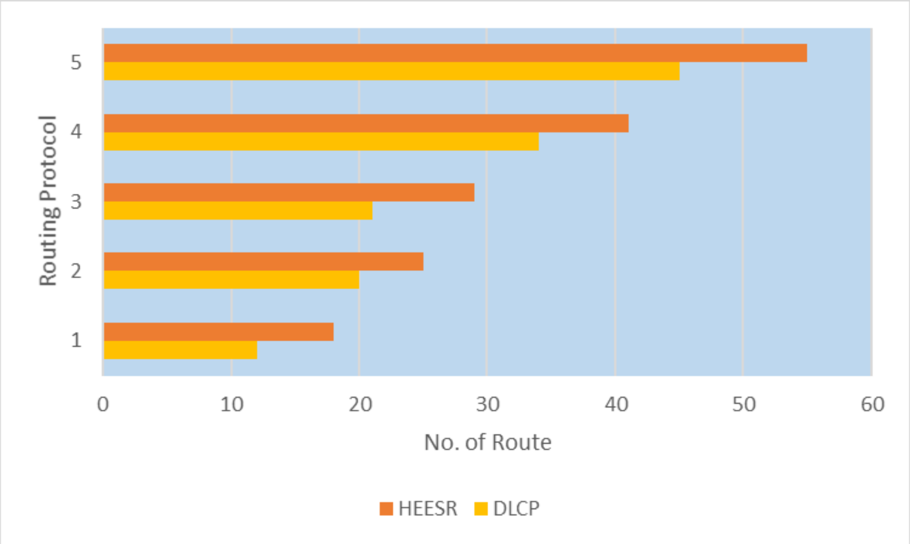

Figure 4: Lifetime network for varied BS

The total number of rounds can be seen in figure 4 until another network is not functional. When 10 % of the total base stations are dead, the network can be considered non-functional. The graphic illustrates the network supporting 100 rpm for the hub, whereas 800 and 900 rpm for the corner positions are still alive. The BS on the angle or boundary is traversed in comparison with the BS in the centre, by lesser SNs. Consequently, the network keeps falling if the nearby nodes are powerless. This contributes to the partition of the network and wastes a tremendous amount of energy.

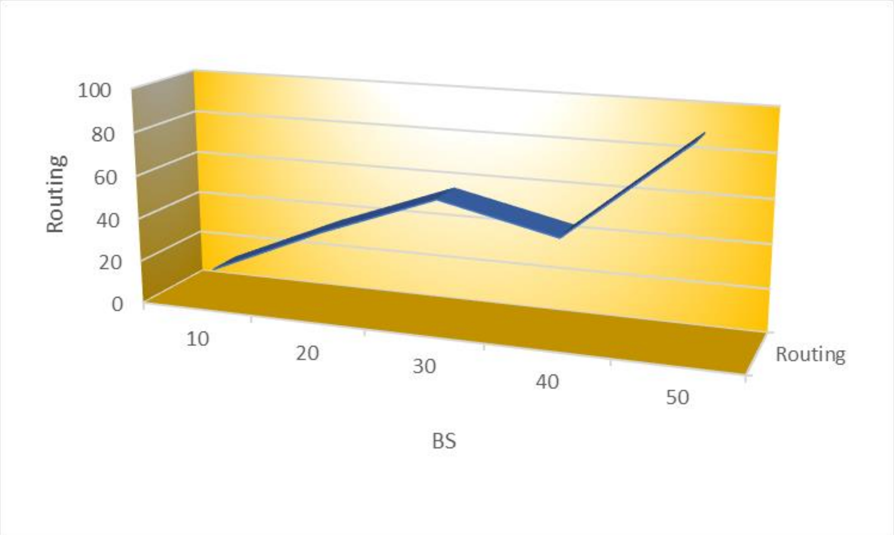

Figure 5: Comparative analysis of sensor network for 100 Nodes

In order to confirm the life - span of a WSN of 100 nodes, Figure 5 provides a comparison between HEESR protocols and the Dynamic Load-Balancing Cluster-Based Protocol (DLCP). Figure 5 shows that perhaps the new optimisation HEESR exceeds DLCP by 10% as the most efficient protocol. These results indicated that the HEESR is less cost-effective because all its sensor node die compared to other techniques. The results prove that even after (850 rounds), the EEUC sensor hop did not stay for more than (950 rounds)of were accomplished by the DLCP.

6 Conclusion

The presentation of the research was motivated by the sensor nodes' energy constraint. The protocols for efficient routing in WSN were proposed in this article. We tended to focus and analysed the efficacy and effectiveness of our proposed protocol support for low power consumption in order to achieve network throughput for WSNs via the HEESR algorithm. In HEESR, only two local measurements are used to choose cluster heads: the residual node energy and the distance to the base station. The use of two parameters on its own focused on reducing overheads in the configuration process. In conventional clustering algorithms, the overall re-clustering process is minimised, which has a significant effect on energy usages. In the case of network reliability and scalability, the simulation results indicate that the HEESR algorithm is above its clients.

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Notes on contributors

OSAMAH IBRAHIM KHALAF is assistant prof in Al-Nahrain University/Baghdad/ Iraq . He has more than 16 years of teaching experience in university-level . He has had many published papers indexed in ISI/Thomson Reuters and he has many achivment in scientific field in a whole world.

GHAIDA MUTTSHAR ABDULSAHIB is a lecturer at in computer engineering department / University of Technology /Iraq. She got a lot of awards in computer engineering area. And Now Ghaida interested in network and communication area.