ENHANCING THE ENERGY THROUGH HYBRID ALGORITHM IN WSN: A REVIEW

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ABSTRACT: Now days, wireless sensor networks applications are frequently used in various technologies for reducing the cost of manufacturing portable wireless sensor nodes. It tends to place multiple mobile wireless sensors in the WSN to improve the quality of service (QoS). The services are primarily affected by the sensor node's life cycle and failures. When the number of sensor nodes increases, the possibility of failure of the sensor node increases. Some routing protocols use clustering as their routing technology. The primary purpose of all routing protocols is to reduce energy consumption. Therefore, the network period, especially the state of the network also improves. There is a tendency to represent the period from the start of the network to the stop of the last node throughout the lifecycle of the network and the amount of stability represents the period from the start of the network to the stop of the primary node. This is opposite to the development of energy-efficient burst period threshold sensitive clustering rules by dynamically selecting cluster heads using multi-hop and multipath, so that different clusters load distribution will eventually increase the duration of the cluster head or legacy node network and compare the performance of the proposed protocol by premixing (Hybrid). It increases the energy usage of WSN nodes and henceforth improves the life cycle network.

Key Words: Cluster Head selection (CHs), Hybrid Algorithm (HA), Low-Energy Adaptive Clustering Hierarchy (LEACH), Self Routing Protocol (SRP), Threshold sensitive Energy Efficient sensor Network (TEEN), Wireless Sensor Network (WSN).

1. INTRODUCTION

Over the last few years the numbers of applications for Wireless sensor networks (WSNs) are rapidly increasing. Wireless sensor networks are state-based maintenance applications, the military for vehicle health management, and its many applications easily deployable in the battlefield, space and industries. In the military field, the main focus is on regional monitoring of safety and monitoring applications. Due to significant growth portable sensors nodes can be manufactured at low cost and have superior results and sensitivity over electronic technology.

Therefore, in order to improve the quality of service of such wireless sensor networks (WSN), it is also possible to deploy a large number of portable sensor nodes in the area. As the use of sensor nodes increases, the likelihood of sensor nodes failing at such WSNs increases. In WSN, battery failure, environmental impact, such as software or hardware failure, is a failure of the sensor node for various reasons. Therefore, WSN needs to create efficient and accurate sensor nodes [4]. A wireless sensor network is a collection of sensor nodes with limited power and limited computation and transmission capabilities. Due to limited transmission and computational capabilities, as well as high-density sensor nodes, packet forwarding is done in multi-hop data transmission.

Therefore, routing in wireless sensor networks has been an important area of research for the past few years. Since it is necessary to operate the sensor nodes in non-rechargeable batteries, it is necessary to use resources efficiently at the same time to efficiently utilize resources to improve energy efficiency, which is an important research topic. Advances in wireless technology and the development of low-cost sensor nodes have led to the introduction of low-power wireless sensor networks. Since sensor nodes are easy to deploy in a versatile, target tracking, environmental monitoring, health care, forest fire detection, inventory management, energy management, it can be used in a variety of applications, such as surveillance and reconnaissance [1]. The main role in the sensor node's network is further to manipulate the information collected from the source to the receiver, resource constraints. [2], the application of the combination of sensor nodes, different applications, different application requirements, unreliable links, designing effective routing algorithms in wireless sensor networks is a daunting task. Routing algorithms designed for a variety of applications and meeting various performance requirements have been recognized as important issues in wireless sensor networks.

1.1 Multipath Routing in Wireless Sensor Networks

The limited capacity and transmission capability of the multi-hop path, and the high dynamics of the radio link single pass approach do not provide effective data transmission rates in wireless sensor networks. To overcome these problems, today's multipass approach is currently in widespread use. As mentioned earlier, multipath routing has proven to be highly efficient to improve the performance of wireless sensors and ad hoc networks. In the following we will review performance improvements that can be achieved using the multipass approach.

1.2 Applications of WNS Sensors

- Military Applications
- Environment Monitoring
- Agricultural Applications
- Support for logistics
- Traffic density monitoring
- Human Centric Applications

2. LITERATURE SURVEY

In the field of wireless sensor network, various types of work have been done so far. In this section, we had gone through different types of techniques and methods described in various research papers for enhancing the energy using different types of hybrid algorithm in wireless sensor networks.

S. Taruna et al. [1] proposed a multi-hop cluster based routing protocol that is more energy efficient than the single hop protocol. The simulation results showed that the proposed protocol provides better performance than single-hop clustering routing protocol from the viewpoint of network life cycle and energy consumption by improving FND. These sensor nodes can detect, measure and collect information from the environment and send sensed data based on some local decision making process and can send it from the source to the destination. WSN usually has little or no infrastructure. It consists of many sensor nodes that can be dozens or even thousands and works together to monitor the area to get data about the environment. These sensors have the ability to communicate with each other or to communicate directly with an external base station (BS). More sensors make it possible to sense larger geographical areas with greater accuracy. Sensors typically transmit these collected data either directly or via a wireless transmitter to a command center (receiver) via a data center (gateway). It is not on the wireless network. Depending on the number of node nodes that can communicate, the cluster and all the nodes in the cluster are cluster heads. The cluster head communicates with the base station via another cluster head. A further base station can communicate directly with the base station of the cluster, but the base station cannot communicate. The nodes and these nodes are the beginning of the cluster in the cluster. These cluster heads communicate with the base station.

Taruna et al. [2] proposed a routing algorithm related to the energy and distance factor of each node. This scheme is then compared with the traditional LEACH protocol, which involves selecting the cluster head closest to a particular node. It concludes that the proposed protocol effectively extends network lifetime while reducing energy consumption in the network.

Avani Patel et al. [3] proposed a cluster based hierarchical protocol TEEN (threshold sensitive energy efficient sensor network protocol) transaction. TEEN's sensor network architecture is based on hierarchical clustering. TEEN is a data-oriented reactive event-driven protocol that is ideal for time-critical applications. We will send data based on hard and soft thresholds. If the threshold is not reached, the node will not communicate.

Zair Hussain et al. [4] proposed a routing protocol based on application and network architecture. Because recognition is a mandatory design standard, many new protocols specialize in routing, power management, and data distribution. Efficient routing in sensor networks requires a routing protocol that minimizes network energy consumption and maximizes network lifetime.

Aswini Kavarthapu et al. [5] proposed a method of detecting a defective sensor node by comparing the actual RTT with the current RTT by the discrete path selection method. This method is simulated with WS 2 using NS 2 with 8 sensor nodes, using a circular topology design.

Pavithra B Raj et al. [6] proposed a failed node recovery algorithm to extend the lifetime of the wireless sensor network when certain sensor nodes are turned off. A wireless sensor network (WSN) typically includes hundreds or even thousands of sensor nodes equipped with communication devices such as sensing, calculating, and short-range communication devices via wireless channels. These nodes can be spread over a large area. Sensor nodes in a wireless sensor network have batteries for their energy sources, but due to sudden energy emissions it is not convenient to charge or exchange batteries.

Wu Weiwei et al. [7] designed a TDMA-based MAC layer protocol. In this protocol, time slots are used to schedule the operation of various sensor nodes. These time slots are used for the various radio activities performed by the sensor node. However, the TDMA-based scheme may result in an inefficient allocation of time slots if any station has idle time slots that do not transmit data.

Shibo et al. [8] designed distributed MAC layer protocols for scheduling human wireless sensor stations believe that there is a strong correlation between the MAC layer and the routing layer, so in order to improve MAC layer based scheduling, it is necessary to consider various routing parameters. They design the protocol using routing, power control and link layer random access parameters. They developed a probabilistic mathematical model to improve MAC layer scheduling by obtaining optimal solutions.

Alma et al. [9] suggested a wireless body domain sensor network system based on human wakeup scheduling has been proposed. Normally, in MAC layer-based scheduling, the wireless sensor station remains aware of the activity even during the idle time slot. In this paper, based on human body data, we identify various traffic patterns and place sensors based on various traffic conditions. This scheme effectively utilizes time slots by considering varying traffic conditions but since the time interval determined for wake-up scheduling is used only for body area wireless sensor networks, a wide range of WSN. It does not apply to applications.

Solaiman, B. [14] proposed that the **e**nergy saving in wireless sensor networks (WSNs) is a critical problem for diversity of applications. Data aggregation between sensor nodes is huge unless it is managed by appropriate sensor data itself. Clustering sensor nodes is considered to be an effective way to solve this problem. Each cluster must have a controller, represented as a cluster head (CH), and multiple nodes located within that monitoring area. Clustering shows the effective results of forming a network of link hierarchies. It is therefore possible to balance the load distribution within the wireless sensor network, effectively utilize the available energy, and reduce traffic transmission. To solve this problem, you need to find the optimal placement of sensors and CH, so you can extend the life of the network with minimal energy consumption. In this paper, they proposed a preliminary idea of K cluster clustering and hybrid clustering algorithm based on particle group optimization (PSO) and named KPSO to realize effective energy management of wireless sensor networks. These KPSO algorithms are correlated to conventional clustering techniques such as the Low Energy Adaptive Clustering Hierarchy (LEACH) protocol and K Average Clustering.

Bouyer et al. [15] suggested the optimum use of energy in wireless sensor networks (WSNs) is very important. Recent studies have shown that organizing network nodes into clusters increases energy efficiency and ultimately extends the network life cycle. Controlling the number and location of cluster heads (CH) and the size of clusters to the number of nodes therefore balances the energy usage of the CH and extends the life of the network. Cluster-based routing protocols are energy-efficient protocols that extend the lifetime of wireless sensor networks. The purpose of clustering is to minimize the total transmit power by aggregating into a single path to prolong network lifetime. In this paper, a fuzzy C means (FCM) algorithm was used for optimum CH numbers and their positions. Using FCM with WSN helps to change the LEACH protocol parameters at run time. The results show that hybrid algorithm extends network life compared to LEACH algorithm.

Brar et al. [16] introduced in his paper that energy consumption is one of the constraints of wireless sensor networks (WSNs). Routing protocols are a hot area for addressing quality of service (QoS) related issues, namely energy consumption, network lifecycle, network scalability, and packet overhead. A key problem with wireless sensor networks is that, these networks suffer from packet overhead, which is the root cause of more energy consumption and lower QoS in sensor networks. In WSN, there are several routing protocols that are used to enhance network performance. Among all of these protocols, the Dynamic Source Routing (DSR) protocol is more appropriate for small energy density, but sometimes when the node mode changes from active to sleep, the efficiency is reduced because the packet needs to wait for the packet to be sent at the initial point. This increases the latency and end-to-end latency of the packet, resulting in increased power consumption.

The problem was to identify dead nodes and choose another suitable path so that data transmission becomes smoother and energy expense is less. In order to solve these problems, they proposed an energy-aware routing protocol based on directional transmission, called PDORP. The proposed protocol PDORP features a power efficient acquisition sensor information system and a DSR routing protocol. In addition, hybridization of genetic algorithms and bacterial for aging optimization is applied to the proposed routing protocol to identify energy efficient optimal paths. Performance analysis, correlated by a hybrid approach to the proposed routing protocol, gives better results, including less bit error rate, less latency, less energy expenditure with better utilization, and better throughput, which leads to better Quality of Service and extend the life of the network. In addition, a computational model is used to evaluate and compare the performance of two routing protocols using soft computing techniques.

Abdul-Salam et al. [17] emphasized on wireless sensor network (WSN) which has become now important part of human life are used in various applications including health care, environment and agriculture, public safety, military, transportation, and industry. It is useful because of limited battery life, but it is still difficult to maintain long-term operation. Several power saving protocols are designed to extend the life of the network. The integration of mobile technology and traditional static sensor network (called hybrid WSN) is committed to providing a new solution that balances energy consumption between sensor nodes and extends the network's life cycle. The energy efficiency of the data collection method is not evaluated from the viewpoint of energy saving technology being used. In this paper, we describe the architecture of data collection method in WSN. Then they presented and discussed classification of data collection types at WSN. This paper also explains the topic of classification of energy saving technology used in various hybrid WSN data collection methods in detail. As a result, they compared various energy saving methods, minimized the energy consumption of the hybrid WSN, and highlighted their advantages and disadvantages. Finally, they pointed out open research topics and future direction in this field.

Shankar et al. [18] described that the energy efficiency was a major concern in wireless sensor networks. For energy efficient data transmission, cluster based technology was implemented through data aggregation to balance energy consumption between sensor nodes of the network. Existing clustering technologies utilizes its own low energy adaptive clustering hierarchy (LEACH), harmony search algorithm (HSA) and particle group optimization (PSO) algorithm. However, separately, these algorithms have constraints on exploration-development trade-off (PSO) and local search (HSA). In order to obtain faster global convergence retrieval, a hybrid algorithm of HSA and PSO algorithm was proposed for energy saving type cluster head selection. This algorithm has high HSA search efficiency and dynamic capability of PSO, which could improve the lifetime of the sensor node.

The performance of the hybrid algorithm is evaluated using the number of active nodes, the number of dead nodes, throughput, and residual energy. The proposed hybrid HSA - PSO algorithm showed that the residual energy and the throughput are 83.89% and 29.00% higher than the PSO algorithm, respectively.

Ray A. and De, [19] proposed Wireless sensor networks (WSNs) consists of an excessive number of tiny sensor nodes deployed in very large numbers which are able to sense, process and transmit environmental information to the base station (BS) and this data is used for many applications. It is suitable for various purposes. Energy efficiency is one of the main problems of maintaining the operation of WSN. In this research, we proposed an energy efficient clustering algorithm based on K average algorithm called EECPK average for WSN. They improved the initial center of gravity selection process using a midpoint algorithm. The proposed method ultimately balances the load on the cluster head (CH) and generates a balanced cluster to extend the lifetime of the network. This considers residual energy as a parameter and takes into account the Euclidean distance used in the basic K averaging algorithm for proper CH selection. Multi-hop communication from the CH node to the BS depends on their distance from the BS. The simulation results showed that the proposed method is superior to LEACH - B in terms of network lifetime and energy efficiency, balanced parallel K average (BPK average), Park method and Mk average. The simulation results also show that the proposed method has up to 50% compared to the Mk - means, 14% compared to the BPK - means protocol, and 10% compared to the Park method compared to the LEACH B It is shown that consumption can be reduced, Reduce by 6%.

Shalli Rani et al. [20] in her paper proposed energy efficient inter cluster coordination protocol developed for the wireless sensor network which increased the scalability and longevity of the network. In this paper, EEICCP (Energy efficient inter cluster coordination) protocol is helpful in evenly distributing of the energy load among the sensor nodes and use the multihop approach for the CHs.

3. MOTIVATION

The design of the clustering technique in Wireless sensor network is influenced by the limited power of the battery that mandate to design the energy efficient clustering protocol. Many researches had been done in the recent past investigating different aspects like low power protocol, network establishment, coverage problems and the establishment of reliable wireless sensor networks. But, even after many efforts, there are still design options open for improvement. This leads to motivate us to develop a new protocol which enables more efficient use of scare resources at individual sensor nodes for an application.

4. PROPOSED WORK

In this paper, we discuss the architecture of clustering protocol and designed through hybrid algorithm to improve lifecycle and energy consumption of self-organizing nodes. For this it is necessary to decide which tool to implement according to the proposed approach and the basics of the tool.

4.1 Paper Proposal

When developing a self-organizing node for WSN, the concept of multi-hop and multipath is introduced. As clusters change continuously, nodes require characteristics such as multimode and multipath. It uses multi-hop and multipath to extend the life of the network and reduce power consumption. Power consumption will be reduced due to load sharing at the cluster head of each cluster. In that case, the sensor network has characteristics and quality measurements quite different from conventional networks.

Due to advanced coordination of sensor nodes and highly specific application goals, routing does not have a "one size fits all" solution, so which routing mechanism to use depends on specific characteristics. In this paper, we conducted a simulation to show that asymmetric communication using multi-hop extends the life of sensor network based on large scale cluster. We also examined the usefulness of implementing the minimum separation distance between cluster heads in a cluster-based sensor network in order to prolong network lifetime.

5. CONCLUSION AND FUTURE SCOPE

Based on the analysis numbers shown, it is clear that SOA is very suitable for improving the network life cycle. In wireless sensor networks, sensors can be placed randomly or decisively. Random sensor placement may be suitable for battlefields and hazardous areas, and deterministic sensors are executable in a friendly and accessible environment. In general, fewer sensors are required to perform the same task in a deterministic deployment. Because wireless sensor networks are usually placed in hazardous or inaccessible environments, energy supply to the sensor nodes is limited and cannot be updated. Because of these limitations, it is necessary to minimize the energy consumption of the node while maximizing its useful life while maintaining network connectivity. After nodes are deployed in ad-hoc mode, wireless communication often self-organizes. These self-organizing sensor networks are limited in terms of system resources such as battery power, coverage, storage space, and processing power.

Low throughput and wireless connectivity make it a real challenge to design such a network. Self-organization can be defined as a process in which the system tends to achieve specific goals with minimal human intervention. . In addition, the node may fail (due to energy shortage or physical damage) and the new node may join the network. Therefore, there is a need to reset it regularly so that the network can continue to run continuously. Each node may be disconnected from the rest of the network, but it must

remain highly connected. Scalability requires that all configuration processes be completely distributed and use only local information. This is a classic problem that all self-organizing systems face, that is, how to get global optimality from future local adaptation.

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