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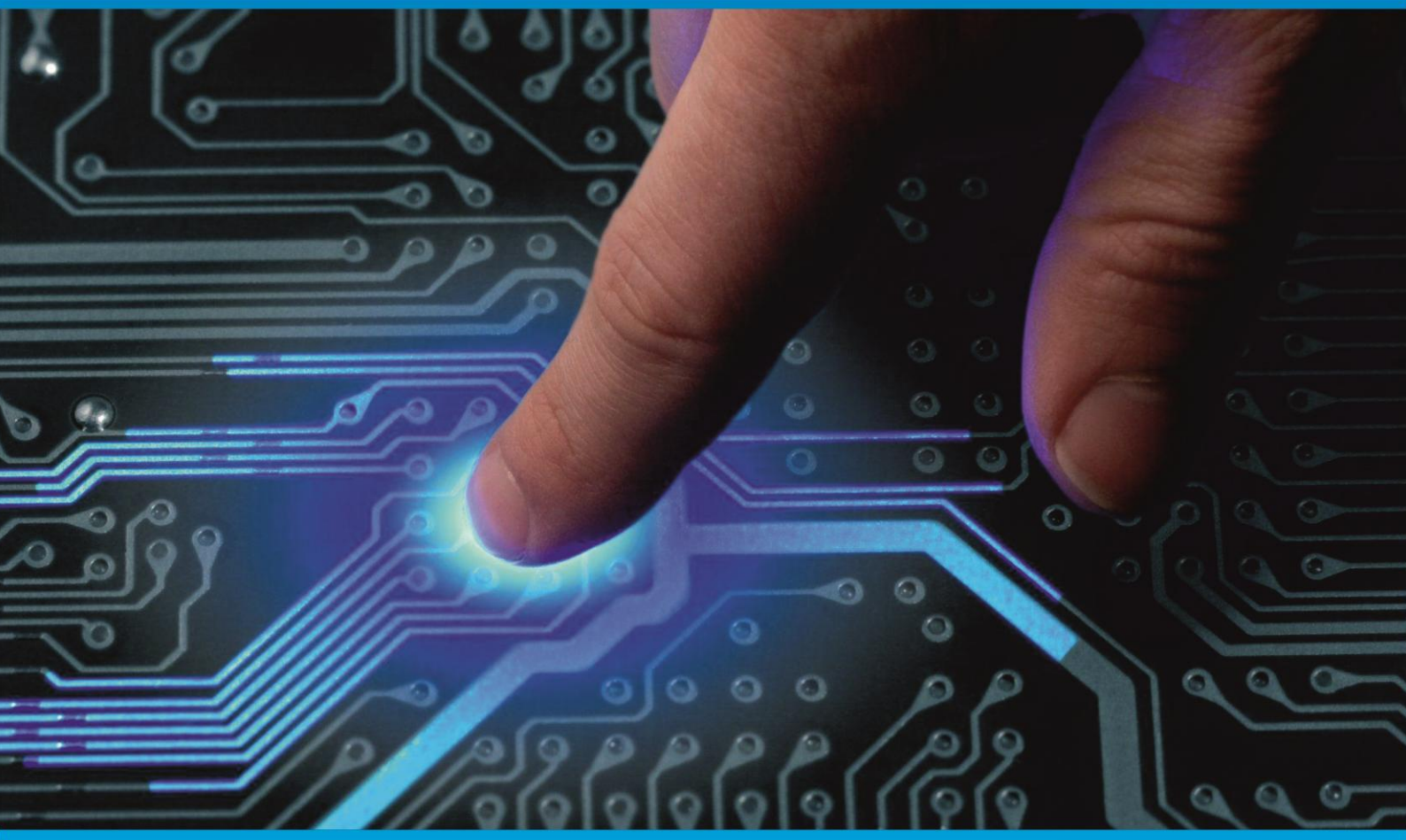

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Review of Wireless Sensor Network Routing Techniques

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ABSTRACT: Wireless sensor network (WSN) is a network consisting of many small independent sensor nodes, which are self-contained units and are capable of self-organizing their networks rather than having a pre-programmed network topology. Sensor node performance like network life time, live node, dead node, average energy, and throughput are major challenges in wireless network. This paper review of various research on wireless sensor network and also focused in upcoming challenges and future applications. MATLAB 8.3 software will be used to design such network and apply novel clustering algorithm to optimize desired outcome so that the overall performance can be enhanced of sensor network over WSN.

KEYWORDS: Wireless, Network, Sensor, lifetime, MATLAB.

I. INTRODUCTION

Wireless sensor networks (WSNs) are one of the chief enabling technologies for the Internet of Things. These networks are severely resource-constrained which calls for designing energy-efficient and effective routing techniques. The hierarchical- or clustering-based routing approaches have shown to improve both energy-efficiency and scalability in WSNs. However, when clustering is implemented in mobile WSNs (MWSNs), the mobility of sensor nodes results in high data loss due to possible dis-association of nodes with their cluster heads which negatively affects the data rates and energy consumption. The Advancement in micro-electronics system is the major cause for the development of WSN in the era of twenty first century. WSN has become very essential for daily user, without WSN our work would have been very burden or hard. WSN are adept of sensing, transforming and bearing of the information. These sensor nodes are generally arranged in a diverse space like in war space where human are hard to reach. WSN generate large amount of data in form of bits or stream. These nodes contact over a precise range of nodes which are frame in an Ad-hoc structure and get the data to the sink. WSN have many limited resources like limited energy, memory, computation power, communication capacity etc.

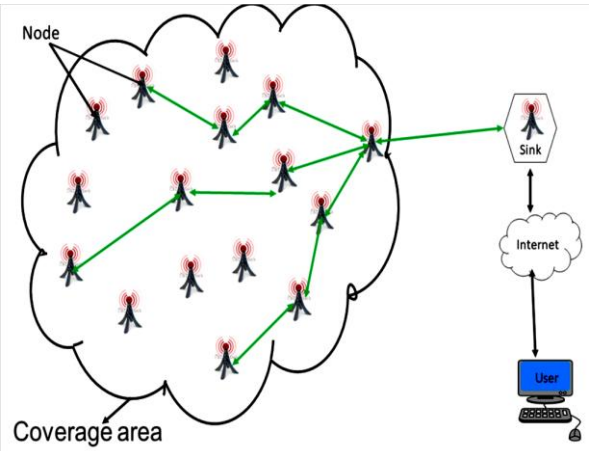

Figure 1: Wireless Sensor Network

Wireless sensor network (WSN) consists of energy constrained nodes with limited computing and communicating capabilities. Routing is the area where energy of the nodes can be conserved to prolong the lifetime of the WSN

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network. There exist some routing protocols, out of which clustering protocols has proven energy efficient because network is divided into multiple clusters and the leader of the cluster will supervise the data routing to the base station/sink after removing redundant data. In this work it is have used hybrid approach for creating the clusters and for forwarding the data to base station. The Cluster Heads (CHs) for first two rounds will be elected by base-station using centralized algorithm and from third round, CHs are selected by the previous cluster heads using distributed algorithm. It is introduce a mobile IGN (Integrated Gateway Node) which acts as an interface between CHs and base station.

There are several IoT applications which are based on WSNs [1] such as healthcare monitoring, vehicular monitoring, fire forest monitoring, street monitoring, environment monitoring etc. These networks are the form of system that is made of hundreds or thousands of wireless sensors with a significant amount of resources which are used in a very wide range of field. In the previous years, we have seen the use of newly developed protocols for information collection in WSN.

WSN is an association of compact micro sensors with wireless communication capabilities. Like many advance technologies, WSN owe its root in heavy industrial applications as well as military applications. The first wireless network that is in line with the latest WSN is the Sound Surveillance System (SOSUS) developed on submerged acoustic sensors. Sensors in SOSUS were distributed in the Pacific ocean Atlantic oceans.

II. RELATED WORK

H. El Alami et al., presents an improved clustering hierarchy (ECH) approach has been proposed to accomplish energy proficiency in WSNs by utilizing dozing waking system for covering and neighboring nodes. Hence, the data excess is limited and then network lifetime is expanded. Interestingly of past hierarchical routing conventions where all nodes are required for gathering and transmitting data, the proposed approach just requires the waking nodes to carry out these responsibilities, which are keys of energy utilization in WSNs. We execute (ECH) approach in homogeneous and heterogeneous networks. Consequences of the recreation show its adequacy.[1]

S. Zafar, et al., presents mobility-aware centralized clustering algorithm (MCCA) and mobility-aware hybrid clustering algorithm (MHCA). The MCCA algorithm employs centralized gridding at both layers of clustering hierarchy, and the MHCA algorithm employs centralized gridding at the upper layer and distributed clustering at the lower layer. The simulation results show that our proposed algorithms improve network lifetime, reduce energy consumption, stabilize cluster formation, and enhance data rates in mobile sensor networks. it is also observe that the centralized clustering approach is superior to the hybrid clustering approach.[2]

T. A. Al-Janabi et al., presents new routing technique will prevent significant energy dissipation by the cluster head and by all nodes in general by scheduling the whole network. Consequently, the SDN controller essentially balances energy consumption by the network during the routing construction process as it considers both the S_{DG} and the movement of the MS. Simulation results demonstrate the effectiveness of the suggested model by improving the network lifespan up to 54%, volume of data aggregated by the MS up to 93% and reducing the delay of the MSopath by 61% in comparison with other approaches.[3]

B. A. Mohan et al., The data transmission from the sensor nodes to the CH will takes place using proactive algorithm and the data transmission between mobile node and base station uses reactive algorithm. Base-station divides the CHs into sectors and assigns mobile node to each sector with the predefined path to relay the data to it. The mobile nodes which is having unlimited energy resources in this architecture is used to conserve energy and prolong life time of the network compared to other routing protocols.[4]

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S.Sasirekha et al., presents the WSN system simulation and evaluated for the performance metrics such as energy consumption, transmission delay and network lifetime. The results demonstrate that the proposed CCMAR outperforms LEACH, PEGASIS and other similar routing algorithm, energy efficient cluster-chain based protocol.[6]

U.Baroudi, et al., presents practical framework, called wirelessly energy-charged (WINCH), for battery maintenance; it involves recharging sensor batteries using mobile robots. This framework integrates a routing process in which the cluster heads are selected optimally, as in the low-energy adaptive clustering hierarchy-centralized protocol (LEACH-C), and the robots visit the sites frequently based on need and place themselves in the optimal positions with respect to the selected cluster heads. This approach considerably reduces overhead compared with existing methods. [7]

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J. Chang et al., presetns goal of this scheme is to reduce the data transmission distances of the sensor nodes by employing the tree structure and multi-hop concepts. Based on the location of mobile sink, the distances between the sensor nodes, and the residual energy of each sensor node, the proposed scheme makes an efficient decision for creating the routing structure. [8]

M. Ozger, et al., Clusters are temporary and they are not preserved after the end of events. Furthermore, it is find average re-clustering probability, expected cluster coverage area, and find maximum event generation frequency for energy-efficient operation of our protocol. it is study performance of our protocol in terms of control and data packet exchange, time steps required for clustering, connectivity of clusters, energy consumed for clustering, and re-clustering ratio due to the mobility. Performance comparison simulations show that our algorithm has better performance in terms of connectivity and energy consumption.[9]

M. Abo-Zahhad, et al., MSIEEP is more reliable and energy efficient as compared with other protocols. Furthermore, it improves the lifetime, the stability, and the instability periods over the previous protocols, because it always selects CHs from high-energy nodes. Moreover, the mobile sink increases the ability of the proposed protocol to deliver packets to the destination.[10]

H. Lee, et al., show that data stashing significantly decreases routing cost for delivering data from stationary sensor nodes to multiple mobile users compared with routing protocols where sensor nodes immediately deliver data to the last known association nodes of mobile users. it is also show that the scheme provides better load balancing, avoiding collisions and consuming energy resources evenly throughout the network, leading to longer overall network lifetime.[11]

S. Ganesh et al., presents the security has been achieved by isolating the malicious nodes using sink-based routing pattern analysis. Extensive investigation studies using a global mobile simulator have shown that this hybrid ESRP significantly improves the energy efficiency and packet reception rate as compared with the SNR unaware routing algorithms such as the low energy aware adaptive clustering hierarchy and power efficient gathering in sensor information systems.[12]

Table 1: Optimization Approaches at WSN Layers

Layer	Network scale	System Life-Time	Node Versatility
Application	Data fusion, Compression	Power- aware	Load detection, Automatic mode decision
Transport	Bounded Delay	QoS-Power Tradeoff	Load-aware transport control
Network	Node naming, Efficient routing , Efficient node discovery	Power- aware routing, Reduced overhead	Load-aware routing, Simplified node discovery, Distributed storage
MAC	Contention control, Channel reuse	Synchronized sleep, Transmission range control	Load aware channel allocation
Physical	Ultra –wide Band	Low-power design, Powerful battery	Attach specific accessories(GPS)

III. APPLICATION AND CHALLENGES

The sensor nodes have limited sensing, computation, communication capabilities and are mostly operated by batteries in a harsh environment with non-replenish able power sources. These restrictions make the sensor network prone to failures because most of the energy is spent on data transmission, sensing, and computing. Many applications such as habitat monitoring, military surveillance and forest fire detection expect the sensor nodes to last for a long time because they operate human unattended. Therefore, the major challenges in designing a wireless sensor network (WSN) are energy conservation, reducing data transmission delay and improving the network lifetime. A major issue in designing of wireless sensor network is of energy limitation. As sensor networks are usually placed in areas which are

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harder to reach, it is difficult to replace them or recharge their batteries. The network lifetime is directly dependent on energy efficiency.

Therefore design of reliable and efficient sensor nodes and routing protocol is a major design challenge. A sensor node consumes energy for sensing analog data, processing the data and transmitting the data.

Another issue is designing of application-specific wireless sensor network setup for different tasks may need to sense different type of data.

Wireless sensor networks (WSNs) have proven to be an effective and dynamic paradigm for many applications, including structural health monitoring and tracking systems. However, the supply of energy to the sensors plays a key role in the success of these applications as well as the design and deployment of these networks. Currently, most WSNs are powered by batteries, which must be replaced frequently, increasing maintenance costs and operational complexity.

IV. CONCLUSION

In this paper, study about Wireless Sensor Networks, its characteristics, advantages and applications is done. Study of components of a Wireless Sensor Node, communication in WSN and different classes of WSN is done. This chapter also contains comparison of Wireless Sensor Networks with traditional Ad Hoc Networks. Study of various issues in WSN like mobility , protocols for WSN, simulators of WSN, manufacturers of WSN Node, cross Layer optimization in WSN are also done .At the last of this chapter organization of the whole thesis and methodology of task is given.

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