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A Survey on Network Lifetime Enhancement in Wireless Body Area Network

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Abstract- **In Wireless Body Area Network (WBAN) is developing speedy advancement and it has such a large number of new techniques and calculations for finding the ideal way to propagate crisis messages. One of the primary social calculations is ACO (Ant Colony Optimization), which takes care of numerous difficult issues, for example, Traveling Salesman Problem (TSP). In the TSP an arrangement of territory (e.g. urban areas) and the separations between them are given. The issue comprises of finding a shut voyage through insignificant length that visits every city. To apply ACO and TSP strategies, we consider the diagram portrayed by a partner the arrangement of urban communities with the arrangement of vertices of the chart. This chart is called development diagram. We set the lengths of the edges between the vertices to be relative to the partitions between the urban areas spoke to by these vertices and we relate pheromone esteems and heuristic esteems with the edges of the diagram. Notwithstanding that, it could consider the healing center condition as one of the fundamental applications. In this work, the ACO approach which serves to Traveling Salesman issue for finding most brief way to send the crisis messages to the specialist by means of sensor hubs and furthermore it has utilized static Bayesian Game Formulation with blended technique which upgrade the system life time. At whatever point the patients require crisis treatment or medicinal care, the crisis messages will be made by the WBAN and sends to the goals of specialist. These interchanges should be possible utilizing ACO and Bayesian Game Formulation.**

Keywords—Wireless body area network, Ant colony optimization, Bayesian game model, Sensor network, Message latency Network lifetime

I. INTRODUCTION

Network security consists of the policies and practices received to prevent and monitor unauthorized access, misuse, modification, or denial of a computer network and network-accessible resources. Network security involves the authorization of access to data in a network, which is controlled by the network administrator. Users choose or are assigned an ID and password or other validating information that allows them access to data and project within their authority. It is likely that these workstations may not be midway overseen, nor would they have border insurance. They may have an assortment of working frameworks, equipment, software and conventions, with various level of digital mindfulness among clients. Presently envision, these a great many workstations on organization arrange are specifically associated with the Internet. This kind of unsecured system turns into an objective for an assault which holds significant data and showcases vulnerabilities.

A body region arrange (BAN), additionally alluded to as a remote body region organize (WBAN) or a body sensor arrange (BSN), is a remote system of wearable registering devices.BAN gadgets might be installed inside

the body, inserts, might be surface-mounted on the body in a settled position Wearable innovation or might be went with gadgets which people can convey in various positions, in garments pockets, by hand or in different sacks.

The improvement of WBAN innovation began around 1995 around utilizing remote individual zone arrange (WPAN) advances to actualize correspondences on, close, and around the human body. A WBAN framework can utilize WPAN remote innovations as doors to achieve longer ranges. Through passage gadgets, it is conceivable to interface the wearable gadgets on the human body to the web. We are presently seeing a developing enthusiasm for the range of remote body territory organizing (WBAN) joined by the solid request of the restorative and medicinal services society and also by the advances in low-control smaller scale and nano-hardware and remote systems administration.

The highlights of ACO are used for sending crisis messages through the most brief way between the WBAN hubs. The ACO approach gives the directing data for on request way setup if the source and goal hubs are known for sending the crisis messages. Network lifetime plays an important role in WBAN. The objectives of this project are: 1) to deploy sensor nodes at optimal locations such that the theoretically computed network lifetime is maximum 2) to schedule these sensor nodes such that the network attains the maximum lifetime. 3) a coverage aware sensor deployment scheme should be developed to ensure sufficient sensing coverage, and 4) to face of sensing node failures, a sensor self-organizing mechanism needs to be devised to efficiently recover the sensing void and restore the detecting scope. Since local repairs generally consume less moving energy and communication overhead than a global redeployment does, the sensor self-shorting mechanism should limit the network recovery/repairing locally to effectively reduce pointless.

Despite its advantages, the node performed about the problem of node localization, requiring frequent advertisement of the changing node position across the network. This operation may result in a significant overhead, which should be minimized to benefit from the energy savings introduced by the network nodes. An increase the network life time and routing protocol should also avoid an extreme increase in the sensor data delivery latencies. Especially for the time sensitive WBAN applications, the validity of the sensor data depends on its deployment.

This project focuses on optimal deployment locations of the sensor nodes with a pre-specified sensing range, such that the network lifetime is maximum with the required coverage level. Since the upper bound of the network lifetime for a given network can be computed mathematically, this knowledge is used to compute locations of deployment such that the network lifetime is maximum. In this proposed ultimate goal is to realize an automated monitoring network so that detection applications of medical care emergency events can be practically implemented.

Sensor systems broaden the current Internet profound into the physical condition. The subsequent new system is requests of size more far reaching and dynamic than the present TCP/IP organizes and is making altogether new sorts of activity that are very not quite the same as what one finds on the Internet now. Data gathered by and transmitted on a sensor arrange depicts states of physical situations for instance, temperature, moistness, or vibration and requires propelled question interfaces and web indexes to successfully bolster client level capacities.

II. RELATED WORKS

There have been a lot of work done on secure routing and network construction in WSN. This area

manages with the survey of some of the ant colony algorithms and game theoretic approaches related to WBAN. Usually in colonies of ant there is no central control for anything. At society, there is a visibility of behavior of ants. Their interesting behavior has made us to do new algorithms. In every field these algorithms play its role. Ant colony optimization is one among the popular algorithm. This framework's agents are ants and it uses memory and decisions for pheromone updating. ACO gives the best result when compared with other state-of-art algorithms.

ACO can be called as search strategy since it updates pheromones for finding solutions. So every ant is responsible for making independent decisions for a answer in improvement using local steps. So the ants will search every second. Then outcomes will be evaluated and updated.

New algorithms and implementation techniques and different methods for lifetime maximization in network are being preferred to make sensor network a best experience for providers as well as users. The surveys on secure routing, techniques, methods have been done and a lot of protocol and algorithms are introduced.

2.1 Enhanced Secure Sensor Association and Key Management in Wireless Body Area Networks [1]

A novel upgraded secure sensor affiliation and key administration convention in view of ECC and hash affixes keeping in mind the end goal to give secure and adjust relationship of a gathering of sensors with a patient and fulfill the prerequisites of information classification and uprightness in BANs. The verification method and gathering key age are exceptionally basic and effective. Along these lines, our convention can be effectively executed in the power and asset compelled sensor hubs in BANs. In the interim, our convention can provide mutual verification between the PC and the HWD, shared confirmation between the PC and the nodes and common validation between nodes.

2.2 Self-Adaptive Data Collection and Fusion for Health Monitoring Based on Body Sensor Networks [2]

A series of simulations on real medical data recordings to show the effectiveness of our algorithms and approaches. The results show that our approach reduces considerably the sensed and the transmitted data and the energy consumption while maintaining data integrity and decision accuracy. This solution alerts the employees when their vital signs become abnormal. In addition, this solution can monitor the stress level of employees allowing the employers to ensure better working conditions. For future work, we intend to test our proposed scheme in a real life WBSN application and to propose a method for the fusion and the aggregation of heterogeneous data in a context-aware WBAN.

2.3 Low-Power Wireless ECG Acquisition and Classification System for Body Sensor Networks [3]

The greater part of the fundamental elements of the proposed framework have been tried and checked. In any case, this framework still needs facilitate change, especially in the synthesizer outline of the handset for multichannel biosignal procurement, the input control for the body-end chip, the joining of the beneficiary and the DSP circuit in a solitary getting end chip, and the blend of the less than desirable end chip and the advanced mobile phone. The new capacities and further combination will be considered later on to finish the individual look after BSNs.[3]

2.4 Efficient Certificate less Access Control for Wireless Body Area Networks [4]

An effective declaration less signcryption plan and after that outline an across control conspire for the WBANs utilizing the given signcryption. Our plan

accomplishes secrecy, uprightness, validation, non-disavowal, open irrefutability, and cipher text credibility. Contrasted and existing three access control plans utilizing signcryption, our plan has the slightest computational cost and vitality utilization for the controller. Furthermore, our plan has neither key escrow nor open key authentications, since it depends on certificate less cryptography.

2.5 Point-to-Point Wireless Information and Power Transfer in WBAN With Energy Harvesting [5]

A point-to-point correspondence framework in a remote body zone organize fit of gathering radio-vitality is contemplated. We explore two situations for transmission, which are in typical situation and in unusual condition. We consider control part convention in typical situation what's more, time exchanging convention in irregular situation at the sensor, individually. In light of two conventions, the ideal power part and time exchanging proportions are determined in every situation. The objective of this paper is to boost the data throughput from the sensor to the entrance point in uplink by adjusting the time term among the charge exchange stage, the vitality collecting stage, and the data exchange stage while fulfilling vitality gathering and utilization adjust imperative at the sensor. Numerical outcomes exhibit the adequacy of the ideal arrangement.

2.6 A Review of Wireless Body Area Networks for Medical Applications [6]

WBANs guarantee inconspicuous wandering wellbeing observing for a drawn out stretch of time, and give ongoing updates of the patient's status to the doctor. They are broadly utilized for pervasive medicinal services, excitement, and military applications. This paper surveys the key parts of WBANs for various applications. We exhibit a WBAN framework that gives answers for on-request, crisis, and ordinary movement. We additionally talk about in-body receiving wire plan and low-control MAC convention for a WBAN. What's more, we quickly plot a portion of the WBAN applications with cases. Our discourse understands a requirement for new power-productive arrangements towards in-body and on-body sensor systems. [6]

2.7 Applications, Challenges, And Prospective In Emerging Body Area Networking Technologies [7]

Remotely associated scaled down sensors and actuators set in, on and around the body shape a body range organize for consistent, computerized, and subtle observing of physiological signs to help restorative, way of life and diversion applications. Boycott innovation is in the beginning time of advancement, what's more, a few research challenges must be overcome for it to be broadly acknowledged. In this article we think about the centre arrangement of utilization, useful, what's more, specialized prerequisites of the BAN. We moreover talk about principal examine difficulties, for example, adaptability (regarding information rate, control utilization, also, obligation cycle), radio wire plan, obstruction alleviation, concurrence, QoS, unwavering quality, security, protection, and vitality productivity. A few hopeful innovations ready to address the rising BAN advertise are assessed, and their benefits and bad marks are featured. A brief diagram of institutionalization exercises significant to BANs is likewise displayed. [7]

2.8 Congestion Control in WBAN in the Field of Heterogeneous Network [8]

The Wireless Sensor Network (WSN) technology plays a significant role in the present day applications considering energy, security, routing, load balancing, optimization etc. The application of Wireless Body Area Network (WBAN) in recent times has significantly increased the potential of remote healthcare monitoring systems. However, the issues considering the

congestion control and the performance of WBAN with respect to energy is still persistent. This paper intends to develop a heterogeneous WBAN network in order to perform congestion control and evaluate the energy efficiency. The control parameters such as distance and the traffic load were also computed which resulted in a more robust analysis on congestion control. Graphs of Cumulative Distribution Function (CDF) vs. traffic load and Probability Density function (PDF) vs. traffic load were given which shows an improved rate in the flow of traffic with respect to congestion control. Evaluation with respect to energy consumption with respect to WBAN nodes is also performed.

III. RESULT AND ANALYSIS

The following table summarizes efficient techniques to obtain the better network, parameters, and other factors. The different algorithms are working on same parameters at some cases. Each algorithm focuses on improving various kinds of requirements in the network. The differences are shown in Table 1.

Table.1 Different routing techniques/algorithms

S.No	Techniques & Algorithms	Parameter Analysis	Conclusion
1	Short range Wireless communication techniques. key management protocol based on elliptic curve cryptography and hash chains.	Time in terms of seconds and 1024 bits modular exponentiation	Suitable for time sensitive applications. Provide secure and correct association group of sensors with a patient and satisfy requirements of data confidentiality integrity BANs.
2	Data collection, Basic decision tree algorithm, Decision matrix and fuzzy set theory.	Energy consumption on the node.	Fusion and the aggregation of heterogeneous data in a context-aware WBSN.
3	High-pass sigma delta modulator super-regenerative on–off keying transceiver.	Power consumption and Frequency.	Diagnose heart disease based on the MIT-BIH arrhythmia Database, Studied in the future to complete the personal care device for BSN.
4	Signcryption, neither key escrow nor public key Certificates.	Time and Energy.	Reduce the computational time and Energy consumption.
5	EH model, and derive the optimal power allocation polices of the throughput maximization problem via dynamic programming and convex	Based on two protocols, the optimal power splitting and time switching ratios are derived in each scenario.	WBAN over path loss channel model with energy harvesting is considered. An optimization problem in this system is proposed to maximize the information

	optimization techniques.		throughput with energy constraint.
6	WBAN traffic requires sophisticated low-power techniques to ensure safe and reliable operations.	A discuss in-body antenna design and low-power MAC protocol for a WBAN.	A technical discussion on the in–body antenna design and supported patch antenna for in-body communication.
7.	Low-power listening and wake-up radios , which are intended to minimize power consumed by idle listening.	Efficient protocols and algorithms for sensor networks, body area networks, and cognitive radios.	The multiple disciplines, must come together and strive hard to overcome technical roadblocks in order to bring the vision of a ubiquitous health care network to reality.

IV. ADVANTAGES

There are many advantages in these shortest routing techniques while using wireless body area network. Depending on the nodes and network life time increased that will get vary.

4.1 Advantages

1) The biggest benefit of shortest path routing techniques is that user and application over the network monitoring access.
2) The network lifetime increased of the sensor network is enhanced by using the scheduling method .
3) The sending emergency messages through the shortest path between the WBAN nodes.
4) There are several ways of computing deployment locations and Bio-inspired algorithms prove to be effective for solving optimization problems.
5) Aim to avoid data loss
6) Organizing of sensor nodes to send data
7) Monitor Battery status of each node in network.

I. CONCLUSION

The optimal shortest path for WBAN has been determined using Ant Colony Optimization algorithm. To check whether the network life time is increased or decreased, we have used Bayesian game formulation with their Nash equilibrium In our proposed method, the ACO approach is used in Travelling Salesman problem which finds the shortest path to send the emergency messages to the doctor by the Way of sensor nodes and also it has used static Bayesian Game Formulation with mixed strategy which enhance the network life time. Whenever the patients need the emergency treatment or medical care, the emergency messages will be created by the WBAN and sends to the doctor's destinations. These communications can be effectively enhanced the emergency messages in real time environment such as hospital environment.

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