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A Review on Wireless Sensor Network for Energy Consumption

Shobha Kushwaha
PG Scholar, Department Of Computer Science & ENGG, TIT BHOPAL
Deepak Tomar
Asst. Professor, Department Of Computer Science & Engg, TIT Bhopal
&
Kamlesh Chandravanshi
ASST. Professor, Department Of Computer Science & Engg, TIT Bhopal

ABSTRACT

A wireless sensors network (WSNs) is a collection of a large number of small, spatially distributed, and autonomous devices. These devices are known as sensor nodes. The Advancement in wireless communication leads to develop wireless sensor networks (WSN). It consists of small devices. These devices amass information by coordinating with each other. These tiny devices are known as a sensor node which consists of CPU (for data processing), memory (for data storage), battery (for energy) and transceiver (for receiving and sending signals or information from one node to further).

The use of WSN is increasing day by day and at the same instance facing quandary of energy constraints in terms of short battery lifetime. Every node depends on the battery resource for assorted activities; this has becoming a most important concern in wireless sensor networks .so in this paper we are providing issues allied to sink repositioning that help to augment battery life time and also we provided information related to various approach for energy competent wsns.

Keyword: Wireless Sensor Network, Energy Efficiency,

I. INTRODUCTION

Sensor networks may consist of many different types of sensors such as seismic, low sampling rate magnetic, thermal, visual, infrared, acoustic and radar, which are able to monitor a wide variety of ambient circumstances that comprise the subsequent:

- Temperature,

- Humidity,
- Vehicular Movement,
- Lightning Condition,
- Pressure,
- Soil Makeup,
- Noise Levels,

Sensor nodes can be used for incessant sensing, occurrence detection, event ID, spot sensing and neighboring control of actuators. The concept of micro-sensing and wireless connection of these nodes undertakes various up-to-the-minute application areas. We categorize the applications into military, environment, health, home and other commercial areas. It is likely to spread out this classification with extra categories such as space exploration, chemical processing and disaster relief.

Advances in electronic and computer technologies have cemented the approach for the propagation of wireless sensor networks (WSNs). WSNs can be used in various ubiquitous and pervasive applications such as military, health monitoring [1, 2], data attainment in perilous upbringing, and habitat monitoring [3, 4]. A typical WSN may embrace hundreds to numerous thousands of sensor nodes that are of inexpensive and have restricted accessibility of both computation power and energy resources. WSNs are often deployed in a random distribution with no existing infrastructure. There might be three types of communication in a sensor network: sensor-to-sensor, sensor-to-sink, and sink-to-sensor.

Securing sensor networks in opposition to these intimidations is an exigent research area due to their wireless and dispersed nature and the serious checks in node battery. So far, research in sensor networks security has made certain progress in enabling particular safety mechanisms, like key establishment, secure localization, or secure aggregation etc.

A sensor can be used for continuous sensing, event detection, event ID, location sensing, and local control of the motor. The concept of partial disclosure wireless connection of these nodes promised many new areas of application. Classify applications in the military, the environment, health, home and other commercial places. It is possible to extend this arrangement with more groups, such as space exploration, chemical processing and disaster relief.

Advances in electronic and computer technology have opened the way for the spread of wireless sensor networks (WSN)

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for. WSNs can be used in various applications and broadcast all over the place such as the army, and health monitoring [1.2], to obtain the data in a dangerous environment, and monitoring of habitats [3.4]. A typical WSN can include hundreds of thousands of sensor nodes that are low cost and availability of all of the capacity and energy and the limited computing resources. WSNs are often published in the random distribution without existing infrastructure. There may be three types of connections on a network of sensors: sensing sensor, the sensor to the pelvis and the pelvic and sensors.

Securing sensor networks against these threats is a difficult area of research because of the nature of the distribution and wireless serious join on the battery and constraints. So far, the sensor networks for security research has been some progress in the provision of specialized security mechanisms, such as the establishment of a key, a safe place, or safe assembly etc.

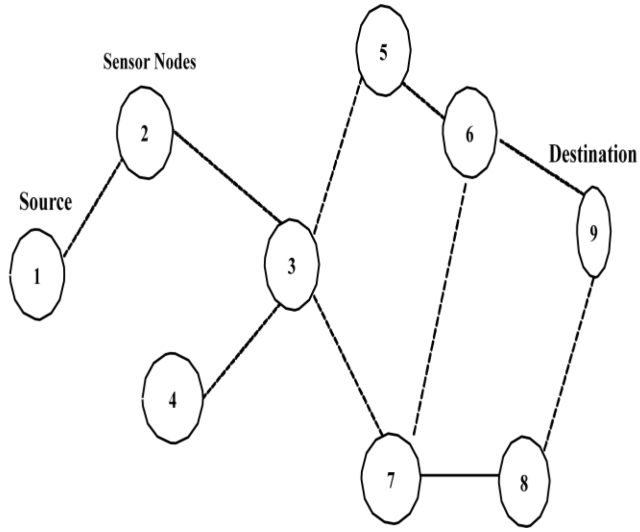

Figure Example of Sensor network

II. CHALLENGES OF WSN

In spite of the diverse applications, sensor networks pose a number of unique technical challenges owing to the subsequent aspects: improvised deployment: the majority sensor nodes are deployed in areas which have no infrastructure at all.

- An archetypal approach of deployment in a jungle would be tossing the sensor nodes from an aircraft. In such a condition, it is up to the nodes to recognize its connectivity and allocation. Unattended maneuver: In most cases, once deployed, sensor networks have no human intercession.

- Therefore the nodes themselves are accountable for reconfiguration in case of any changes. Untethered: The sensor nodes are not associated to any power supply. There is only a restricted source of energy, which must be optimally used for processing and communication. An interesting fact is that communication dominates processing in energy consumption. Thus, in order to make optimal use of energy, communication should be minimized as much as possible. Dynamic changes: It is required that a sensor network system be adaptable to changing
- Connectivity (for e.g., due to addition of more nodes, failure of nodes etc.) as well as changing environmental stimuli.

III. ENERGY EFFICIENCY

Energy consumption is the most important factor to determine the life of a sensor network because generally sensor nodes are determined by battery and have very low power resources. This makes energy optimization more complex in sensor networks since it implicated not only in diminution of energy utilization but also prolonging the life of the network in so far as doable. This can be done by having energy awareness in every aspect of design and operation. This guarantees that energy attentiveness is also integrated into groups of communicating sensor nodes and the intact network and not only in the individual nodes. A sensor node usually consists of four sub-systems: a computing subsystem: It consists of a microprocessor (microcontroller unit, MCU) which is responsible for the control of the sensors and effecting of communication protocols

•. MCU's by and large maneuver beneath various operating modes for power management purposes. But shuttling among these operating modes involves utilization of power, so the energy consumption levels of the various modes should be considered while looking at the battery lifetime of each node. A communication subsystem: It consists of a short range radio which is used to communicate with neighboring nodes and the outside world.

• Radios can operate under the Transmit, Receive, Idle and Sleep modes. It is important to completely shut down the radio rather than put it in the idle mode when it is not transmitting or receiving because of the high power consumed in this mode a sensing subsystem: It consists of a group of sensors and actuators and links the node to the outside world

•Energy consumption can be reduced by using low power components and saving power at the cost of performance which is not required. A power supply subsystem: It consists of a battery which supplies power to the node. It should be

- The existence of a battery can be amplified by dropping the current radically or even turning it off often.

IV. COMPONENTS OF A WSN NODE

A WSN node encloses numerous technical components. These comprise the radio, battery, microcontroller, analog circuit, and sensor interface. When using WSN radio technology, you must make important trade-offs. In battery-powered systems, elevated radio data rates and more repeated radio use devour more power. Often three years of battery life is a requirement, lots of WSN systems nowadays are based on ZigBee due to its low-power utilization. Because battery life and power management technology are constantly evolving and due to the available IEEE 802.11 bandwidth, Wi-Fi is appealing machinery.

The subsequent technology deliberation for WSN systems is the battery. In addition to long life requirements, you must regard as the dimension and mass of batteries as well as intercontinental values for shipping batteries and battery user-friendliness. The cut-rate and extensive ease of use of carbon zinc and alkaline batteries make them a universal variety.

To extend battery life, a WSN node periodically wakes up and transmits data by powering on the radio and then powering it recoil to marmalade energy. WSN radio technology must competently send out a signal and allocate the system to revert to sleep with least power use. This means the processor involved must also be able to wake power up, and return to sleep mode resourcefully. Microprocessor drifts for WSNs include reducing power consumption while retaining or rising processor swiftness. Much like your radio choice, the power consumption and processing speed trade-off is a key concern when selecting a processor for WSNs. This makes the x86 architecture a difficult option for battery-powered devices.

V. SINK RELOCATION

In WSN, sinks are surrounded with plentiful wherewithal and sensors that produce data are termed as sources. The sources can send out data to one or manifold sinks for the intention of analysis and processing.

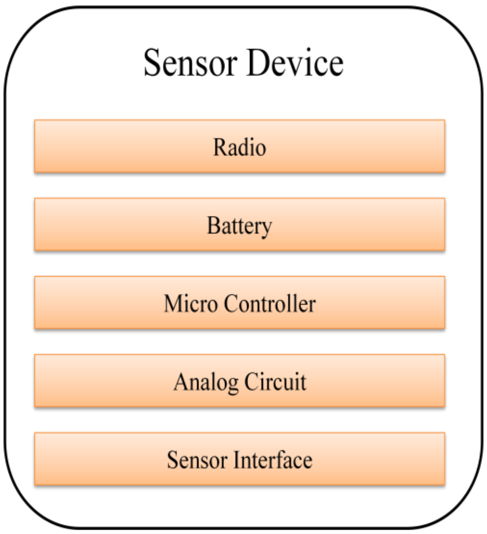

Figure. WSN Sensor Node Components

[5] In wireless sensor networks, sink relocation is favored by all applications that engross concurrent traffic for even in the middle of manifold nodes it can poise the traffic load and thereby diminish the miss rate of instantaneous packets. To perform sink repositioning, numerous sink deployment and sink mobility can be considered. Particular information of the area being monitored is required to proffer an idyllic solution by the sink deployment method, but this method is not a pragmatic repeatedly. To reallocate the sink, it is odd pattern of energy must be considered. [6]

VI. ISSUES OF SINK REPOSITIONING

1. When the gateway rearrangement is levelheaded, where the gateway has to be placed and how the data traffic has to be handled all through the gateway's movement is the most essential subject. Given the traffic distribution and network state at that time, gateway relocation must be based on the motivation by the inefficient pattern of energy depletion or an intolerable increase in the missed deadlines whenever real time packets are used. If such condition is detected, then to enhance the network performance the gateway should identify the most suitable location.
2. Finding an efficient strategy for optimal gateway location is complex and it is NP hard problem. Two characteristics of gateway that are responsible for complexity are as follows,
   - The gateway can be moved to immeasurable possible positions, which is the first responsible characteristic for complexity.

Table 1 : Various Approach For Energy Efficient Wireless Sensor Network

C	Approached used	Merits	Demerit
[1]	Focuses on the complexity of the structure of the topology of wireless sensor network and analyze their complex characteristics in terms of the theory of network science.	In mesh network, the node degree is uniformly distributed, have comparatively smaller mean path length and greater coefficient cluster.	Greatly reduce the average length of trajectory.
[2]	Energy organized aware clustering protocol (secc) for sensor networks wireless sensor network group based energy node and groups of remote nodes. If the energy of the node is less than the threshold value, secc self-organized clusters of forms and reorganize the sensor array.	Techniques energy management increases the life cycle of the sensor array and to improve production efficiency.	Cluster management techniques need to use large number of control packet.
[3]	Increase the number of heads of munitions range sensor and increase the transmission range of individual nodes directly reduces the energy consumed while monitoring intrusion	increasing the precision of the sensor increases energy consumption while monitoring intrusion	Larger number of head increase traffic over network that degrade packet delivery ratio
[4]	In lf-gfg, a packet is forwarded greedily in a virtual network until the packet gets stuck and forwarded along the face boundary in the connected	Greater packet delivery rate compared to existing approach.	Still needed gps system for leaf node location.

	spanning planar sub graph.		
[5]	This approach combination of routing and solar power is analyzed as enhancement of energy conservation technology.	Enhance the energy conservation approach which reduces the energy consumption, cost and complexity.	Waste heat from devices can be reused or employed to solve some routing problems
[6]	They have also developed a location-wise pre-determined heterogeneous node deployment strategy based on the principle of energy balancing derived from this analysis, leading to an enhancement of network lifetime.	Extending network lifetime without compromising the other network performance metrics such as end-to-end Delay, packet loss and throughput	Do not improve and considering qos parameters
[7]	Support vector machine (svm) based locality sensitive hashing tree to classify node on the basis of battery power.	It achieves lower delay , overhead and optimal power consumption .	Do not gives better performance over grid of sensor network with different transmission rate.
[8]	Proposed topology control and routing problem relevant in the context of energy-efficient design of data-gathering wsns having mixed-integer linear rogramming (milp) model to determine the sink and cluster-head (ch) locations in the network as well as the data flow from sensors to the sink(s) over a time period	Very effective in addressing this composite hitch. analogous execution not only achieves a speed-up of the computations, but also yields better solutions as it can travel around the explanation space more efficiently	Do not have any concept for energy efficiency, and spatial redundancy

- Every temporary discovery solution of gateway location requires the construction of new multi- hop network topology to corroborate that the recent provisional resolution is precise than prior provisional resolution. The mathematical expression for this problem necessitates more parameters such as positions of all deployed sensors and state parameters like energy level and transmission range. For a network with large number of nodes, the pursuance of exhaustive search will be impractical.
- Further, when the gateway is moved multiple times, the optimization process has to be repeated for the dynamic nature of the network makes the sensor state and sources of data variant.

3. All the above to the optimization dilemma, the gateway have requirement of performing transaction analysis between the old and new location for gain achieved and overhead on sensors. For instance, the affect on the lifetime of an individual sensor and the system level metrics such as usual energy per packet has to be painstaking when energy metrics are of supreme apprehension. The gateway moves towards the location in case the rearrangement is warranted. For this situation, the transaction analysis has to be done so that the data are not gone astray. However, data loss can occur by packet losses, when the gateway stirs out of the transmission range of the sensors that have straight communication path with the gateway.

VI. RELATED WORK

Topology structure is the primary stride for scheming and assembling wireless sensor network. A desirable topology can prolong the life-time of the whole network. Ren Yueqing [1] focuses on the complexity of the topology structure of the wireless sensor network and considers its multifaceted uniqueness from the viewpoint of network science hypothesis.

Energy organized aware clustering protocol (SECC) [2] for sensor networks wireless sensor network group based energy node and groups of remote nodes. If the energy of the node is less than the threshold value, SECC self-organized clusters of forms and reorganize the sensor array. Energy organized aware clustering protocol increases the life cycle of the sensor array and to improve production efficiency. But on other hand Cluster management techniques need to use large number of control packet.

Hartwell, R [3] present models that calculates the energy consumption of a network, by increase the number of heads of munitions range sensor and increase the transmission range of individual nodes directly reduces the energy consumed while monitoring intrusion. But larger number of head increase traffic over network that degrade packet delivery ratio.

In LF-GFG [4], a packet is forwarded greedily in a virtual network until the packet gets stuck and forwarded along the face boundary in the connected spanning planar sub graph. LF-GFG have greater packet delivery rate compared to existing approach but still needed extra battery power for GPS system for leaf node location.

Vijey Thayananthan [5] presents an approach that is combination of routing and solar power is analyzed as enhancement of energy conservation technology. Enhance the energy conservation approach which reduces the energy consumption, cost and complexity but waste heat from WSN devices can be reused or employed to solve some routing problems such as identifying path and optimization. Heat energy not only reduces the cost of energy but also it protects the internal components of the devices used in the WSN.

Subir Halder [6]developed a location-wise pre-determined heterogeneous node deployment strategy based on the principle of energy balancing derived from this analysis, leading to an enhancement of network lifetime. Extend network lifetime without compromising the other network performance metrics such as end-to-end delay, packet loss and throughput. But do not improve and considering QoS parameters.

Patil, P [7] present a support Vector Machine (SVM) based locality sensitive hashing tree to classify node on the basis of battery power. It achieves lower delay, overhead and optimal power consumption. But do not gives better performance over grid of sensor network with different transmission rate.

Hui Lin [8] present topology control and routing problem relevant in the context of energy-efficient design of data-gathering. WSNs having mixed-integer linear programming (MILP) model to determine the sink and cluster-head (CH) locations in the network as well as the data flow from sensors to the sink(s) over a time period. Parallel implementation not only achieves a speed-up of the computations, but also yields better solutions as it can explore the solution space more effectively. But don't have any concept for energy efficiency, and spatial redundancy.

VII. PROPOSED WORK

It is seen that most of the previous approaches for chose alternate path directly when any node shout down that dropped performance and have relative higher complexity. As the mobile nodes operate on the limited power of battery therefore it becomes very necessary to develop techniques which can successfully maintaining lesser complexity. The objective is to develop a new approach which can successfully maintain the rout with lesser battery power in order to long survival of Sensor network

VIII. CONCLUSION

In this paper made a survey of the routing protocols and the energy conservation methods to try and conserve the battery energy of the sink node from depleting. Wireless sensor networks have been developed and applied to industrial, commercial, defence and civil sector applications. Energy is the main goal in sensor networks. Battery power consumption is a major issue in the sensor network environment. Most researchers have aimed to design energy-aware routings to safeguard the handling of the battery energy to lengthen network lifetimes. A relocatable sink is an additional approach for prolonging network existence by avoiding staying at a definite location for too long which may harm the lifetime of nearby sensor nodes. This article is a review of various issues of sensor network. Here sink relocation has also discussed by which such problem can be solved.

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