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An Enlightment on different Reviews for Wireless Sensor Networks

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Abstract: *Wireless sensor networks with highly varying requirements and characteristics have found their way in a wide variety of applications. As a result, the hardware and software support issues relating to the specific application requirements was very difficult to discuss. In those wireless sensor networks, where there is close collaboration between application domain experts, hardware designers, and software developers is required to implement efficient system. That field of multidisciplinary research area is particularly problematic .So many algorithms and researches have been presented to make the sensor network so efficient and reliable but each has their own pros and cons. In the current paper, we will be going to enlighten the different researches done by different authors.*

Keywords: *Wireless Sensor network ,WSN.*

1. INTRODUCTION

Wireless sensor network is a network that is formed by the combination of different sensor nodes to form the cluster in an unattended environment with the capabilities of sensing. These sensor nodes construct and dynamically maintain the structure of the network through wireless communication and transmit the respective data to the Base-Station after aggregating it from all the nodes in the cluster. Sensors node are equipped with a radio transceiver and a set of transducers through which they acquire information about the surrounding environment. Basic Structure of Wireless Sensor Architecture is shown in Figure1.1

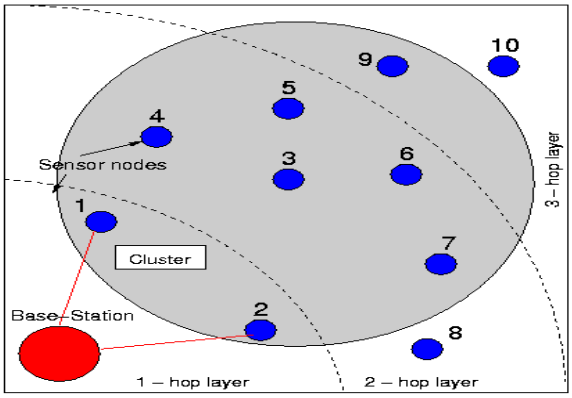

Figure 1.1 Basic Architecture of Wireless Sensor Network.

Each Sensor Network Node has typically several parts:-

- A Radio transceiver – with an internal antenna or connection to an external antenna.
- A microcontroller – an electronic circuit for interfacing with the sensors.
- A battery or an embedded form of energy harvesting.

1.1 Applications of Sensor Networks

A set of applications for sensor networks in different fields have already emerged including medicine, agriculture, environment, military, Inventory monitoring, intrusion detection, motion tracking, machine malfunction, toys and many others.

- In the medical field sensor networks can be used in physiological parameters of patients such as heartbeat or blood pressure, and report to the hospital when some parameters are altered.
- In agriculture, they can be used to monitor climatic conditions of different zones of a large cultivated area and calculate different water or chemicals needs.
- In structure health monitoring applications, sensor networks are deployed on structures such as bridges, buildings, aircrafts, rockets etc. to ensure reliability and safety.
- Sensor networks can be used to detect and locate damages as well as predict remaining life more effectively and economically with respect to traditional monitoring systems.

- The military can take advantage of sensor network technology too. They can deploy such networks behind enemy lines and observe movements/presence of troops and/or collect geographical information on the deployment area.

Several surveys and discussed various aspects on wireless sensor networks. In this survey, we give a comprehensive review on how to control security and load balancing in wireless sensor networks.

1.2 Characteristics of Wireless Sensor Network:

- Low energy use.
- Dynamic and autonomous operation network
- Power consumption constraints for nodes using batteries or Energy harvesting.
- Ability to deal with the Node failures.
- Heterogeneity of nodes
- Scalability to large scale of deployment
- Ability to withstand harsh environmental conditions
- Ease of use.
- Low cost & energy implies low power CPU, radio with minimum bandwidth and range.

1.3 Overview of a Wireless Sensor Networks Communication Architecture

Wireless sensor Network is becoming very popular technology. Before deploying any application, it is important to understand the architecture of WSN. Wireless sensor networks are a collection of various individual nodes. These nodes are interlinked together. As shown in Figure 1.2, the wireless sensor network and the classical infrastructure comprises of the standard components like sensor nodes (used as source, sink/actuators), gateways, Internet, and satellite link, etc. Illustration of sensor network and backbone infrastructure Figure1.2.

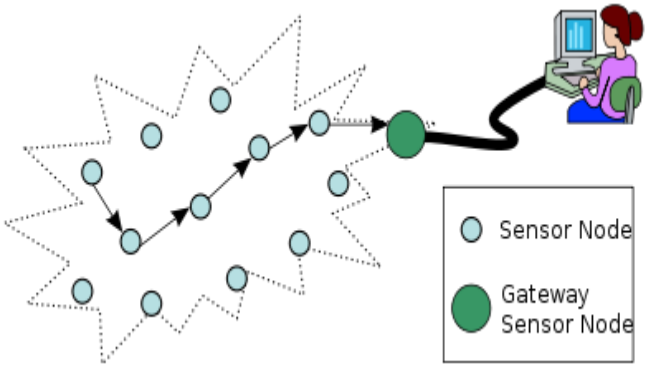

Fig.1.2 Illustration of sensor network and backbone infrastructure

- **Sensor nodes**

Sensor nodes are the network components that will be sensing and delivering the data. Sensors are tiny devices which are deployed in ad-hoc manner that are capable of monitoring events and gathering data about the environment. After computations, it can pass its data to its neighboring nodes or simply pass the data as it is to the Task Manager. The sensor node can act as a source or sink/actuator in the sensor field.

- **Gateways**

Gateways allow the system managers to interface remotes to personal computers (PCs), personal digital assistants (PDAs), Internet and existing networks and protocols. Gateways can be classified as active, passive, and hybrid.

1. Active gateway allows the sensor nodes to actively send its data to the gateway server.

2. Passive gateway operates by sending a request to sensor nodes.

3. Hybrid gateway combines capabilities of the active and passive gateways.

- **Task Managers**

With the help of some media like Internet or satellite link,Task Manager will connect to the gateways. All information (raw, filtered, processed) data coming from sensor nodes is stored in the task managers for analysis.

2. Different Reviews

1. ***In 2003 Stefan Dulman ,Tim Nieberg, Jian Wu and Paul Havinga*** have proposed Trade-Off between Traffic Overhead and Reliability in Multipath Routing for Wireless Sensor Networks. They have mentioned that in wireless sensor networks (WSN) data produced by one or more sources usually has to be routed through several intermediate nodes to reach the destination. They have concluded that problems arised when intermediate nodes failed to forward the incoming messages. So , the reliability of the system was increased by providing several paths from source to destination and sending the same packet through each of them (the algorithm is known as multipath routing). But by using this technique, the traffic has increased significantly. So, In their paper, they have analyzed a new mechanism that enabled the tradeoff between the amount of traffic and the reliability. According to their observations, the data packet was split in k sub-packets (k = number of disjoined paths from source to destination). If only Ek sub-packets (Ek < k) were necessary to rebuild the original data packet (condition obtained by adding redundancy to each sub-packets), then the trade-off between traffic and reliability could be controlled.

2. ***In June 2004 Mr.Gang Zhou, Tian He, Sudha Krishnamurthy, John A. Stankovic*** have proposed Impact of Radio Irregularity on Wireless Sensor Networks. In their paper, they have investigated the impact of radio irregularity on the communication

performance in wireless sensor networks. Radio irregularity is a common phenomenon which arises from multiple factors, such as variance in RF sending power and different path losses depending on the direction of propagation. From their experiments, they discovered that the variance in received signal strength was largely random Their results showed that radio irregularity had a significant impact on routing protocols, but a relatively small impact on MAC protocols. Finally, they proposed six solutions to deal with radio irregularity. They evaluated two of them in detail. The results obtained from both the simulation and a running tested demonstrate that their solutions greatly improved communication performance in the presence of radio irregularity.

3. ***In January 2005 Xiaohong Sheng, Yu-Hen-Hu*** has proposed Maximum Likelihood Multiple-Source Localization Using Acoustic Energy Measurements with Wireless Sensor Networks. In their paper respective, they have presented a maximum likelihood (ML) acoustic source location estimation method for the application in a wireless ad hoc sensor network. Their method use acoustic signal energy measurements taken at individual sensors of an ad hoc wireless sensor network to estimate the locations of multiple acoustic sources. After observations, they have concluded that if compared to the existing acoustic energy based source localization methods, their proposed ML method delivered more accurate results and offered the enhanced capability of multiple source localization. In this paper, a multi-resolution search algorithm and an expectation–maximization (EM) like iterative algorithm were proposed by the authors just to expedite the computation of source locations.

4. ***In 2008 Yanjun Sun, Shu Du ,Omer Gurewitz and David B. Johnson*** has proposed DW-MAC: A Low Latency, Energy Efficient Demand-Wakeup MAC Protocol for Wireless Sensor Networks. According to the author perspective , Duty cycling is a widely used mechanism in wireless sensor net-works (WSNs) to reduce energy consumption due to idle listening, but this mechanism also introduces additional latency in packet de-livery. Several schemes have been proposed to mitigate this latency,but they are mainly optimized for light traffic loads. A WSN, how-ever, could often experience busty and high traffic loads, such as due to broadcast or convergecast traffic. In this paper, they have presented new MAC protocol, called Demand Wakeup MAC(DW-MAC),that introduces a new low-overhead scheduling algorithm that al-lows nodes to wake up on demand during the Sleep period of an operational cycle and ensures that data transmissions do not collide at their intended receivers. They have showed that this demand wakeup adaptively increases effective channel capacity during an operational cycle as traffic load increases, allowing DW-MAC to achieve low delivery latency under a wide range of traffic loads including both uni-cast and broadcast traffic. They have compared DW-MAC with S-MAC (with and without adaptive listening) and with RMAC using ns-2 and show that DW-MAC out performs these protocols, with increasing benefits as traffic load increases. The Example provided by them is, under high uni-cast traffic load, DW-MAC reduces delivery latency by 70% compared to S-MAC and RMAC, and uses only 50% of the energy consumed with S-MAC with adaptive listening. Under broadcast traffic, DW-MAC reduces latency by more than 50% on average while maintaining higher energy efficiency.

5. ***In 2011 S. H. Gajjar, S.N. Pradhan and K.S. Dasgupta*** have proposed Wireless Sensor Networks: Application led research perspective. In their respective paper ,they have mentioned that a Wireless Sensor Network is a network of sensors that, senses specified parameter(s) related to environment; processes data locally or in a distributed manner and wirelessly communicates information to central Base Station. The Base Station analyzes information and initiates suitable response if required. According to their perspective, wireless Sensor Network research as a whole suffers a lack of practical application scenarios for which such networks are the best solution. They have concluded that Researchers generally do not emphasize on the application domains they are trying to address. Therefore they cannot accurately assess the efficiency of their proposal because for different application areas there are different technical issues. This paper discusses role of application in research and fleshes out from the literature applications of sensor networks ranging from billion dollar satellites to tiny RF tags. To aid in application led research they have demonstrate that different applications take different directions in the design goals. Based on the same observation the sensor network design goals and its various directions are characterized. They have mentioned that such explicit design direction works as a framework for discussing and structuring coordinated research (e.g., scrutinizing mutual dependencies between applications, software, hardware and hence avoiding duplicate work). Their observations also provides a conceptual basis for the development of flexible software and hardware frameworks that can be adapted to meet different application needs.

6. ***In April 2012 B. P. S. Sahoo, Satyajit Rath and Deepak Puthal*** have proposed "Energy Efficient Protocols for Wireless Sensor Networks: A Survey and Approach". In their respective paper , they have mentioned that wireless Sensor Networks have limited

resources with traditional data gathering techniques. One of the limitations of Wireless sensor nodes is its inherent limited energy resource. They have observed that designing an effective wireless sensor network to maximizing the lifetime of sensor node in order to minimize maintenance and maximize overall system performance becomes important. In their paper, they have outlined the design factors and challenges in sensor networks. They have described several MAC layer and routing layer protocols proposed for sensor networks. In this respective paper, they have proposed an adaptive approach to find out an optimal routing path from source to sink when the sensor nodes are deployed randomly deployed in a restricted service area with single sink. Their analysis have showed that their approach have reduced the message communication to find out a optimal routing path. Hence, the network consumes less energy and increases the lifetime of the network

7. ***In 2014 Debasmita Sengupta and Alak Roy*** have proposed A Literature Survey of Topology Control and Its Related Issues in Wireless Sensor Networks. In their respective paper , they have concluded that Issues of Topology control (TC) have captured more attentions in Wireless Sensor Networks (WSN). While WSN applications are normally optimized by the underlying network topology. According to their perspective ,WSNs is one of the most interesting areas of research now a day's and are universally being used and deployed or implemented to monitored the surrounding physical environments. They have mentioned that a number of approaches have been invested in wireless sensor networking, such as topology directed routing, sensor coverage based TC and network connectivity based TC. Many schemes have proved to be able to provide a better network monitoring and communication performance with prolonged system lifetime. In this paper paper, they have provided a view of the studies in the area of WSN with different topology issues. By summarizing previous achievements and analyzing existed problems, they have provided some idea within this field and also pointed out some research in the future direction.

Conclusion and future work

In the current work we have demonstrated that Sensor networks in which different researches has been presented. This paper conducts a survey of Wireless Sensor Network design issues, protocols and algorithms,redundancy,accuracy,extended range of sensing, energy conservation, scalability that have been proposed by different authors to solve the problem or integrated the network. We have observed that communication protocol and network system complexity have been reached at very high level beyond human ability to manage and secure it. There is a need for a approach to have energy efficient protocols that provide better results and safe the data that is on greater risk from general disrepair. Future network algorithms need to be adaptive, robust, and scalable with fully distributed and self-organizing architectures. In future we will present the Hybrid scheme in wireless sensor network, so as to make it more reliable and efficient for load balancing and data transmission.

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