COMPARITIVE ANALYSIS OF CONSUMED NETWORK ENERGY IN WSN: A REVIEW

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Abstract: **This paper explored the consumed network Energy in WSN for improving their network life time and energy consumption. This required to decide the tool to implement follows proposed method and also studied the basics of tool.WSNs are utilized in environmental observation, security, medical applications, etc. The device nodes are typically every which way deployed in a very specific region. These device nodes collect their information and send it to the base Station (BS) via some routing protocol. These nodes can't be recharged from time to time to stay them alive. They have to follow a protocol that must make sure the efficient use of their power, so those nodes could function long as potential to none external help. A routing technique plays a key role in their energy consumption. In this paper we have made simulations that show that asymmetric communication with multihop extends the lifetime of large cluster based sensor networks. We have also investigate the best routing method for the sensor so that the energy consumed has minimized so that network life enhanced.**

Keywords: **Routing Protocol, Consumed Energy , Cluster Head, Wireless Sensor Network, Network Life Time**

I. Introduction

Wireless Sensor Networks (WSNs) can be defined as a self-configured and infrastructure less wireless networks to monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants and to cooperatively pass their data through the network to a main location or sink where the data can be observed and analyses. A sink or base station acts like an interface between users and the network. One can retrieve required information from the network by injecting queries and gathering results from the sink. Typically a wireless sensor network contains hundreds of thousands of sensor nodes. The sensor nodes can communicate among themselves using radio signals. A wireless sensor node is equipped with sensing and computing devices, radio transceivers and power components.
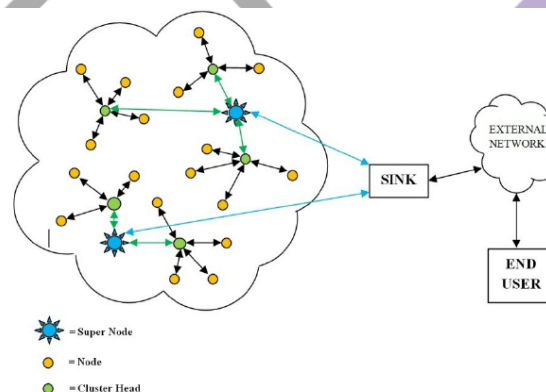

Fig1: A typical Wireless Sensor Network

The individual nodes in a wireless sensor network (WSN) are inherently resource constrained: they have limited processing speed, storage capacity, and communication

bandwidth. After the sensor nodes are deployed, they are responsible for self-organizing an appropriate network infrastructure often with multi-hop communication with them. Then the onboard sensors start collecting information of interest. Wireless sensor devices also respond to queries sent from a "control site" to perform specific instructions or provide sensing samples. The working mode of the sensor nodes may be either continuous or event driven. Global Positioning System (GPS) and local positioning algorithms can be used to obtain location and positioning information. Wireless sensor devices can be equipped with actuators to "act" upon certain conditions. These networks are sometimes more specifically referred as Wireless Sensor and Actuator. A wireless sensor network (WSN) can be defined as a network of (possibly low-size and low complex) devices denoted as nodes that can sense the environment and communicate the information gathered from the monitored field (e.g., an area or volume) through wireless links; the data is forwarded, possibly via multiple hops relaying, to a sink (sometimes denoted as controller or monitor) that can use it locally, or is connected to other networks (e.g., the Internet) through a gateway.

Classification of sensor network on basis of their mode of functioning and the type of target application are:

1.1 Proactive Networks

Nodes in this network periodically switch on their sensors and transmitter, sense the environment and transmit the data of interest. Thus, they provide a snapshot of the relevant parameters at regular intervals. These types of networks well suited for applications requiring periodic monitoring of data.

1.2 Reactive Networks

In this scheme the nodes react immediately to sudden and drastic changes in the value of a sensed attribute. These types of networks are well suited for time critical applications.

II. Energy consumption issues in wireless sensor network

Energy consumption is the most important factor to determine the life of a sensor network because usually sensor nodes are driven by battery. Sometimes energy optimization is more complicated in sensor networks because it involved not only reduction of energy consumption but also prolonging the life of the network as much as possible. The optimization can be done by having energy awareness in every aspect of design and operation. This ensures that energy awareness is also incorporated into groups of communicating sensor nodes and the entire 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 implementation of communication protocols. MCUs usually operate under various modes for power management purposes. As these operating modes involves consumption of power, 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 communicate with neighboring nodes and the outside world. Radios can operate under the different modes. It is important to completely shut down the radio rather than putting it in the idle mode when it is not transmitting or receiving for saving power.

• A sensing subsystem: It consists of a group of sensors and actuators and link 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 seen that the amount of power drawn from a battery is checked because if high current is drawn from a battery for a long time, the battery will die faster even though it could have gone on for a longer time. Usually the rated current capacity of a battery being used for a sensor node is less than the minimum energy consumption. The lifetime of a battery can be increased by reducing the current drastically or even turning it off often.

To minimize the overall energy consumption of the sensor network, different types of protocols and algorithms have been studied so far all over the world. The lifetime of a sensor network can be increased significantly if the operating system, the application layer and the network protocols are designed to be energy aware. These protocols and algorithms have to be aware of the hardware and able to use special features of the micro-processors and transceivers to minimize the sensor node's energy consumption. This may push toward a custom solution for different types of sensor node design. Different types of sensor nodes deployed also lead to different types of sensor networks. This may also lead to the different types of collaborative algorithms in wireless sensor networks arena.

III. Bachground

AlSkaif et al. (2017) Some new application scenarios for Wireless Sensor Networks (WSNs) such as urban resilience, smart house/building, smart agriculture and animal farming, among others, can be enhanced by adding multimedia sensors able to capture and transmit small multimedia samples such as still images or audio files. In these applications, Wireless Multimedia Sensor Networks (WMSNs) usually share two conflicting design goals. On the one hand, the goal of maximizing the network lifetime by saving energy, and on the other, the ability to successfully deliver packets to the sink. In this paper, we investigate the suitability of several WSNs MAC protocols from different categories for low data rate WMSNs by analyzing the effect of some network parameters, such as the sampling rate and the density of multimedia sensors on the energy consumption of nodes.

Han et al. (2017) recent breakthroughs in wireless technologies have greatly spurred the emergence of Industrial Wireless Sensor Networks (IWSNs). To facilitate the adaptation of IWSNs to industrial applications, concerns about networks' full coverage and connectivity must be addressed to fulfill reliability and real time requirements. Although connected target coverage algorithms in general sensor networks have been extensively studied, little attention has been paid to reveal both the applicability and limitations of different coverage strategies from an industrial viewpoint.

Misra et al. (2017) this paper focuses on the theoretical modeling of sensor cloud, which is one of the first attempts in this direction. They endeavor to theoretically characterize virtualization, which is a fundamental mechanism for operations within the sensor-cloud architecture. Existing related research works on sensor cloud have primarily focused on the ideology and the challenges that wireless sensor network (WSN)-based applications typically encounter. However, none of the works has addressed theoretical characterization and analysis, which can be used for building models for solving different problems to be encountered in using sensor cloud.

Azizi, R. (2016) Extend the life of a wireless sensor network (WSN) is a fundamental challenge, as they have a limited supply. Multiple protocols and approaches have been proposed to minimize power consumption. Routing protocols and especially the hierarchical approach is one of the techniques used to minimize energy consumption and to improve the duration of network life.

Deng et al. (2017) in this study, we show that the energy-based method of sound source localization can be successfully exploited

for sound source localization under low power consumption conditions. Sound source localization is widely applied in battlefield environments where low power consumption is especially crucial and necessary for extending the lifespan of sensor nodes.

Yan et al. (2016) Due to a battery constraint in wireless sensor networks (WSNs), prolonging their lifetime is important. Energy-efficient routing techniques for WSNs play a great role in doing so. In this paper we articulate this problem and classify current routing protocols for WSNs into two categories according to their orientation toward either homogeneous or heterogeneous WSNs. They are further classified into static and mobile ones.

Spirjakin et al. (2016) Monitoring of hazardous and combustible gases at industrial premises and in the living apartments has been a topic of top priority for a number of decades. Within the last decade a great many of solutions have been proposed including the one relying on the Wireless Sensor Network (WSN) paradigm. Being an autonomous monitoring system, it is essential to guarantee a long lifetime of gas WSN. In this work, we are investigating and implementing a number of heating profiles for catalytic and semiconductor sensors used on board of the wireless sensor nodes to reduce their power consumption. After analyzing the pros and cons of these profiles, we propose the heating profile based on the Pulse Width Modulation (PWM) and the multi stage heating profile. Experimental results demonstrate that the average current consumption of the gas sensor node can be reduced up to 0.76 mA and its power consumption up to2.54 mW thereby ensuring the autonomous operation of the sensing device for more than one year.

Heinzelman et al. developed the LEACH protocol (Low Energy Adaptive Clustering Hierarchy) which can be classified as a hierarchical algoritm, due to its inherent creation of clusters. The LEACH operation is composed by two phases: a setup phase and a steady-state phase. The setup phase needed in order to create the clusters inside the network and elect the cluster heads in each cluster.

Arti Manjeshwar and Dharma p. Agrawal proposed a formal classification of sensor networks, based on their mode of functioning, as proactive and reactive networks. Reactive networks, as opposed to passive data collecting proactive networks, respond immediately to changes in the relevant parameters of interest. They introduce a new energy efficient protocol, TEEN (Threshold sensitive Energy Efficient sensor Network protocol) for reactive networks. The performance of protocol for a simple temperature sensing application was being evaluated. In terms of energy efficiency, the protocol has been observed to outperform existing conventional sensor network protocols. TEEN is based on a hierarchical grouping where closer nodes form clusters and this process goes on the second level until the BS (sink) is reached.

IV. Research Proposal

The main objective my thesis is to develop an energy efficient increased lifetime threshold sensitive clustering algorithm by dynamic selection of cluster heads using multi-hops and multi-path, that leads to load balancing on different-different clusters. This results in the enhancement of cluster heads or normal nodes network lifetime. And also to evaluate the performance of our protocol, we have implemented it on the MATLAB 2013 simulator with the integrated model of Advance Clustering protocol. The ultimate objective of this paper is to find the consumed network energy in WSN and Compare it and find out the best one. Futher simulate analysis of consumed energy in MATLAB and compare the energy of various protocol (TEEN, LEACH, SEP etc.).

V. Methodology

Developing a wireless sensor node in area introduce many other aspect where the challenges comes like clustering, minimization of energy, routing system etc. A advancement of WSN for reducing the consumed energy need clusteing technique has been introduced. Due to cluster change continuously it has to necessary for node to have the feature like multimode and multipath. This will use multi-hop and multi-path for increasing the network life and decreasing the consumption of power. The power consumption will be less due to load balancing on cluster heads of every cluster.

VI. Conclusion

Sensing can be defined as a technique that is used to gather information about a physical object or process, including the occurrence of events (i.e., changes in state in rise of temperature or pressure). A device performing such a sensing task is called a sensor. The constraint most often associated with sensor network design is that sensor nodes operate with limited energy budgets. Typically, they are powered through batteries, which must be either replaced or recharged (e.g., using solar power) when depleted. For some nodes, neither option is appropriate, that is, they will simply be discarded once their energy source is depleted. Whether the battery can be recharged or not significantly affects the strategy applied to energy consumption. Thus when we create sensor nodes in MATLAB, an energy model needs to be defined which is the energy each node has at the beginning of simulation. Various algorithm which calculate energy and lifetime of WSN like TEEN, Leach, and Genetic algorithm has been compared through MATLAB 2013.

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