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Energy Optimization in Wireless Sensor Network: A Survey

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Abstract: *Energy efficiency is a central challenge in sensor networks and the radio is a major contributor to overall energy node utilization. These Wireless Sensor Networks have severe reserve constrain and energy protection is very necessary. The aim of this paper is to initiate the energy utilization scenario in WSN and propose a novel method for this.BFO stands for Bacteria Foraging Optimization, this technique is used in this paper, bacteria eat nutrient gradients, this process is called chemotaxy process All bacteria does not necessarily get same amount of nutrients, when chemotaxy process ends all bacteria try to take their positions back, bacteria which got less nutrients are less healthy and which got more are more healthy, unhealthy bacterias die and healthy get divided into two healthy bacterias so population size remain same.*

Keywords: *WSN, Energy Consumption, BFO.*

1. Introduction

An Energy good organization is a central defy in sensor networks, as battery substitute is costly and often difficult in difficult to get to deployment region. Several pains have addressed energy competence in sensor networks, through the design of energy saving, but in this paper evolutionary algorithm will be described for energy saving [1].
Radio energy consumption is a main constituent causal to the overall energy utilization at each node. Current MAC protocols put the radio in sleep mode while there is no data to send or receive, in order to minimize energy consumption. Although most radios for sensor networks support multiple sleep modes, the radio sleep mode in current MAC protocols is static. Choosing a static low-power mode involves an energy and delay tradeoff. The deepest sleep mode, which turns off the oscillator and electrical energy regulator, provide the lowly current draw of all low-power modes. However, it also involves the highest energy cost and the longest latency for switching the radio back to active mode. In contrast, the lightest sleep mode provides a transition to active mode that is quick and energy inexpensive, but it has a higher present draw. In a near to the ground traffic situation, it is better to use the deep sleep mode as nodes spend more time sleeping than switching back and forth between sleep mode and energetic mode. In a elevated transfer scenario, a lighter sleep mode is more suitable as the cost of switching the radio frequently into deep sleep mode would exceed the energy saving of the deep sleep mode's low current draw [2].

2. Sensor Node Architecture

A sensor node has to be equipped with the right sensors, the necessary computation unit, memory resources, and adequate communication facilities to fulfill certain task. Normally, a sensor node is comprised of four basic components: one or more sensor elements, a battery (power unit), a memory and processor unit, and a transceiver, as shown in Figure 1.1.

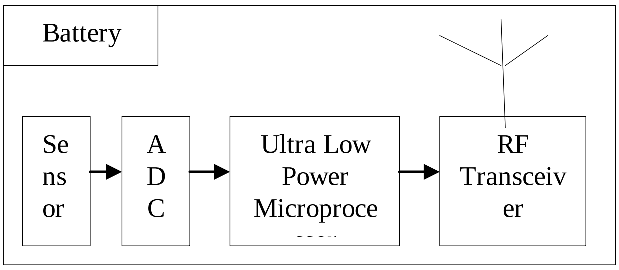

Figure 1.1 WSN Structure

A node may also have additional application-dependent components such as a position judgment system, an assemble or a power generator. Sensing units are usually composed of sensors and analogue to digital converters (ADCs). The analogue signals produced by the sensors (based on the observed phenomena) are converted to digital signals by the ADC. The converted signals are received by the processing unit. The processing unit, which is associated with a certain quantity of recollection, manages the node operational with others when executing the sensing task. Available sensors in the market include generic (multi-purpose) nodes and gateway (bridge) nodes. A generic (multi-purpose) sensor node's task is to take measurements from the monitored environment. Gateway (bridge) nodes gather data from generic sensors and relay them to the bottom station. Entrance nodes have higher processing capability, battery power, and [3] transmission (radio) series. A mixture of general and entrance nodes is typically deployed to form a WSN.

3. Literature Survey

[4] Sandra Sendra, Jaime Lloret, Miguel García and José F. Toledo, 2011

Wireless sensor networks have become increasingly popular due to their wide range of application. Energy utilization is one of the major constraints of the wireless sensor node and this limitation combined with a typical deployment of large number of nodes has added many challenges to the design and management of wireless antenna networks. They are analyze from several points of view: Tool hardware, broadcast, MAC and routing protocols.

[5] Raghavendra V. Kulkarni, Senior Member, IEEE, and Ganesh Kumar Venayagamoorthy, Senior Member, IEEE, 2010.

These papers outlines issue in WSNs introduce PSO and discusses its suitability for WSN application. It also presents a brief review of how PSO is tailored to address these issues.

[6] Gogu, A. ; Lab. Heudiasyc, Univ. de Technol. de Compiegne, Compiegne, France ; Nace, D. ; Dilo, A. ; , 2011.

The Wireless Sensor Networks (WSNs) design related questions give rise to new complex and difficult theoretical problems and challenges in operations research and optimization area. As WSNs happen to more and more pervasive, a good understanding of these problems in terms of theoretical complexity is of great help in designing suitable algorithms. In this document, they look at some of the most fundamental optimization problems connected to reporting, topology control, scheduling, routing and mobility in WSNs. Then they focus on their complexity and analyze the differences that exist with the counterpart conventional theoretical problems or those already studied in traditional networks. They present as they some of the main methods proposed in the literature and report some open issues regarding these problems.

[7] Debmalya Bhattacharya1 and R.Krishnamoorthy, 2011

Wireless Sensor Networks (WSNs) consist of a network of wireless nodes that have the capability to sense a constraint of interest. Sensors of different types are deployed all over and pervasively in varied environments such as office building, nature assets, battle fields, mobile networks, etc. The paper presents such a design which minimizes cost and power utilization, thus attractive the life time of the node.

[8] Jun Luo and Liu Xiang,2011.

This paper focuses on exploiting mobility to improve the network lifetime of a WSN. They present a general optimization framework that is able to capture several aspects of maximizing network lifetime (MNL) involving movable entities. They also in attendance certain numerical results where engineering insights can be acquire.

4. Optimization Layers

From layer-wise aspect, the optimization goals of each layer for a WSN are summarized in figure 1.2.

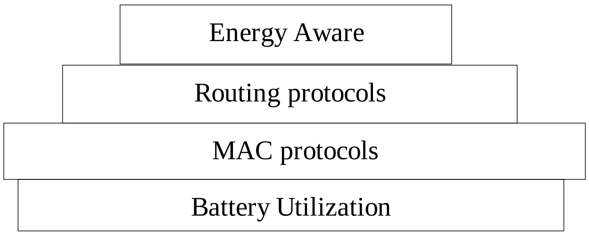

Figure 1.2 *Optimization through different layers*

In the application layer, the traffic load can be compressed to reduce the data size; other algorithms such as in network data dispensation, have been residential to reduce energy utilization compared to transmitting all the [9] raw data to the end join. The routing layer and MAC layer can be optimized by select suitable protocols to gain efficiency. Node optimization can be achieved by improving bat- terry utilization and implementing power-aware hardware design. Three dissimilar types of optimizations are secret, as the optimization of the communication layers, the node optimization and cross-layer optimization. In the following paragraphs, those three will be introduced and discussed.

5. Objectives

1.To implement Wireless Sensor Network by deploying number of nodes in the designed network.
2.Utilize Bacteria Foraging Optimization Algorithm to develop the network performance efficiently
in terms of broadcasting the messages so that node will consume less energy.

3.Measure the performance of the network based on performance metrics such as: energy consumption, packet overhead, throughput, end to end delay.

6. MOTIVATION

Communication between each node in a WSN (due to its inherent characteristics) distinguishes WSNs from other wireless networks. Hence, many new protocols have been proposed for the communication problems in WSNs. These protocols have to be designed with concern for these inherent features along with the application and architectural requirements. Therefore, the selection of a good set of protocols for a given task before a WSN's practical deployment is an important issue.

With the proper set of protocols selected, the number of nodes deployed in a fixed area draws our consideration. Typically, nodes density range from few sensor nodes to hundreds in a fixed area. When a large number of nodes are deployed, can users fully utilize the high density nature of the WSN? Can they still maintain elementary coverage in the target area in the case that some nodes fail (Note that failure of several sensor nodes may not harm the overall performance of a WSN)? Normally, the design process follow the order that people in this field firstly put more and more effort into inventing new protocols and new applications; then the solution are build, experienced and evaluated either by simulation or test beds; even sometimes an actual system has to be deployed so that researchers can learn by empirical evidence. A more scientific analysis procedure is ideally required before a WSN is practically deployed.

It is accepted that the current designers in the area are mainly experts in wireless sensor networking and hardware who could perceive the communication behavior between each nodes at the bit level. As WSNs immerse deeper into people's lives, they must begin to include less specialized users. In such cases, a scheme which can offer optimal solutions based on expert knowledge and can be easily used is muscularly preferred to support a wider audience of users [10].

7. BFO BASED OPTIMIZATION: FUTURE OPPORTUNITY

BFO is a robust technique which is based on search of nutrient gradients and is a resourceful for global search technique BFO is machine learning representation, and following steps are taken in order to solve the problem [11]:

- Initialize random population with time based on chemo tactic movement of a bacterium
- Evaluate fitness function after foraging, Test for termination case
- Initialize time counter, Select sub population, Perform Selection of the individuals
- Perform crossover and mutation steps for selection of the parents which fit for the next generation, Go to step 2

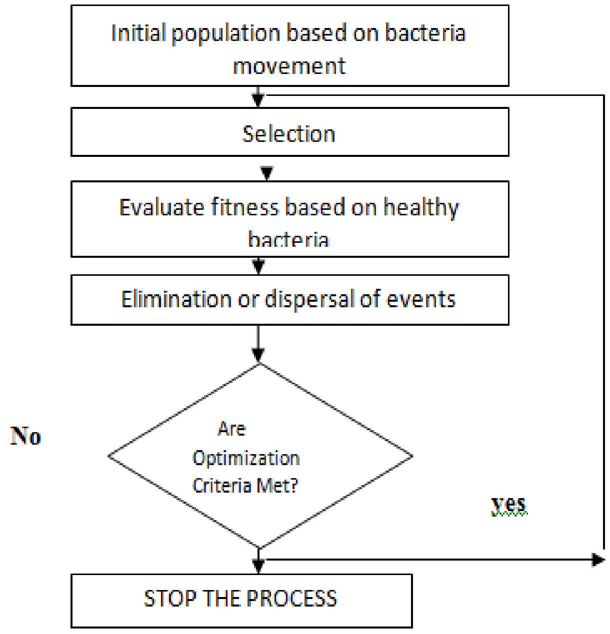

Figure 1.3 Bacteria Foraging Optimization Process

8. CONCLUSION AND FUTURE SCOPE

In current times, the technology of wireless sensor network has a great crash on technical fields like wireless message, information technology, electrical etc. Though the major problem faced in this knowledge is that the sensor nodes run out of energy very quickly. Many routing protocols have been planned to solve this problem mainly focus on the success of minimizing the energy utilization in the sensor system. In this paper optimization algorithm i.e. BFO has been planned for future scope.

9. TOOLS USED

Table.1 Tools Used

Computer	Core 2 Duo or higher
RAM	3 MB
Platform	Windows 7
Other hardware	Keyboard, mouse
Software	Matlab 7.10.4

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