Efficient Collaborative Sleep Scheduling Scheme and an Adaptive Feedback Approach for Energy-Efficient Wireless Sensor Networks

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Abstract- *Over the past two decades Wireless Sensor Networks (WSNs) and their applicat ions have been the topic of research and industry in view of its capability to monitor physical or ecological conditions. Now a day WSN (wireless sensor networks) widely used in the most of applications, so for that we are using the wireless sensor. Because of that limited battery power is one of the most challenging aspects of WSN protocol design i.e. energy efficiency has long been the focus of research. So for that the sensor having two nods one is sleeps and second is wake up node. We propose ADP, an adaptive energy efficient approach solves the requirement of lo w energy consumption and same time reduces the traffic load.ADP increases energy efficiency adjusting sensor nodes sleep and wake -up cycles. Simu lation experiments with different traffic loads have shown that ADP improves energy efficiency wh ile keep ing latency low. We put the effort to adaptive energy saving approach called ADP for wireless sensors to effectively extend the network lifetime without using latency report. The goal of ADP is too great adjust sleep time for each node dynamically, and to adapt working with the sensor nodes with changing underlying sensing event load, remaining battery level, and the importance of sensing data.*

Keywords- ADP, wireless sensor networks, scheduling scheme

I. INTRODUCTION

Wireless sensor network comp rises of extensive number of little, minimal cost, and low power sensor nodes with limited storage capacity, computational and co mmunication assets and a base Station. These nodes continuously monitor ecological conditions and gather detailed in formation concerning the physical environment in which they are deployed and later transmit the gathered information to the BS. BS is an entryway fro m sensor systems to the outside world. The BS has a huge storage and substantial data handling abilities. It passes the data received fro m sensor nodes to the server fro m where end -client cans access data according to their need. The sensor nodes are generally deployed in the region of the Base Station and form clusters according to the need of the Base Station. WSN has a benefit of being operated unattended in the surroundings where nonstop human monitoring is either risky or not feasible. Sensor nodes keep operating on batteries and once nodes are deployed in the system their batteries can't be energized, so they have short life duration. There are deferent uses of Wireless Sensor Networks; they are primarily deployed in health hand military applications, air contamination checking, and land slide recognition and to monitor water quality. Furthermore , WSNs are applied in robot control, automatic manufacturing, once or home robotization. WSN is useful in detecting forest _res based on heat data it receives from extensive number of scattered sensor nodes. The utilization of wireless sensor networks is expanding step by step and in the Meantime it confronts the issues of energy constraints in terms of limited battery lifespan. As every node relies on upon energy for its activities, this has turned into a noteworthy issue in wireless sensor network. The failure of one sensing node in an application can ruin the whole system. Every

sensing node canbe in active (for receiv ing and transmission activities), id le and sleep modes. In awake state nodes consume energy when receiving or transmitting data. In idle mode, the nodesdevour just about the same measure of energy as in active mode, while in sleep mode, nodeshut-down the radio to save the energy. The following steps can be taken for saving energycaused by communication in wireless sensor networks [1].

1. To schedule the condition of the hubs (i.e. awake, id le or at rest).
2. Using proficient routing and informat ion gathering strategies.
3. Changing the transmission scope of the sensor nodes.
4. Avoiding the handling of repetitive informat ion as on account of overhearing.

In WSNs its battery is only source of life for the nodes. Co mmunicat ing with other nodes or sensing actions consumes a lot of energy in handing out and transmitting the collected data to the sink or base station. Much of the time, it is undesirable to replace the batteries that are exhausted or depleted of energy. Nu merous analysts are in this way trying to discover power-aware protocols for wireless sensor networks in order to conquer such energy efficiency troubles as stated above.

II. RELATED WORK

Most sensors are generally equipped with non - rechargeable batteries with inadequate energy [2]. On the o_ chance that the sensor nodes continuously transmit the gathered information to the cloud, the energy of sensor nodes will be depleted quick and the entire integration scheme won't work long. Ru izhuo Song, Qinglai Wei [3], p roposes a novel sensor scheduling scheme based on adaptive dynamic programming, which makes the sensor energy consumption and tracking error optimal over the system operational horizon for wireless sensor networks with solar energy harvesting. Neural network is used to model the solar energy harvesting. Kalman filter estimation technology is emp loyed to predict the target location. In this paper, we will further study the optimal scheduling problem for WSNs with solar energy harvesting. First, the solar energy model is established by neural network (NN) and the energy consuming of each sensor isgiven. For a target motion model, Kalman filter (KF) technology is used to obtain the measure of sensors. Thenthe optimal sensor scheduling problem is developed. ADP based sensor scheduling method is established, and the convergence property of the presented method is proven. Finally, the simulation study is given to show the effectiveness of the developed scheduling scheme. As energy waste through idle listening, retransmissions and overhearing are some of the primary causes of reduced lifetime in wireless sensor networks, sensor sleeping is critically important. Sleep ing techniques prolong the network lifet ime by placing co mponents of the sensor node into a sleep mode wh ile aiming to min imize the impact on application performance. Sensor sleeping can be applied to different layers of the protocol stack, and a cross -layer sleep manager can orchestrate sleeping in mu ltip le layers simu ltaneously [6].

A. Energy Consumption and Sleep Scheduling in WSNs

In sensor nodes energy is consumed either fro m useful or wasteful sources. Useful energy consumption occurs due to transmitting or receiving of data. Wasteful energy utilizat ion can be due to one or more of the following facts [4]. Co llision: When a recipient node receives more than one packet at the same time, these packets are called collided packets. When a transmitted packet is corrupted it has to be disposed, and the follow on re - transmission increase energy utilizat ion which increases latency. Overhearing: a node picks up packets that are planned to send to other nodes. control packet overhead: Sending and receiving control packets consumes energy too, and less useful data packets can be transmitted. So negligible number of control packets ought to be used to make a data transmission. Control packets consume lots of energy in packet trans mission and less valuable data packets are transmitted. Idle listening: more often the time nodes are in idle mode if nothing is sensed. It is a major source of inefficiency. Over- emitting: This is caused by the message transmission when the source node sends data and destination node is not prepared to receive it. The most effective energy - conserving operation is putting the radio transceiver in the sleep mode whenever commun ication is not required. Duty cycling is one of the energy saving technique in WSNs. Duty cycle is the fraction of t ime of nodes which are active during their lifetime .

B. Scheduling

Scheduling is necessary to imp rove the life of network which saves the time and energy so the network beco mes mo re vigorous exile and proficient. In the Multiprogramming operating system to increase the throughput of the system scheduling is used with the processes.Such operating systems run many processes which is to be overloaded inside the executable memory at the same time and that process shares the CPU by using the technique called mu ltip lexing. All the waiting processes are stored into the queue for execution. When the process is load into the system, it Is stored into the job queue. This queue is a collection of all processes of the system which is handling properly by using scheduling for improving the performance of the system.

C. WSN Scheduling

A Scheduling in WSN is used to deal with the sequencing of packets to transmit and receive queues of the wireless network interface controller, wh ich is use circular data buffer. Different schedulers are available for WSN. Wireless sensor networks are collection of a many nu mber of sensor nodes which speaks through a radio channel. The WSN is developed for sensing a certain physical variable, collecting data and forward ing them to the base station where the information is processed for further purposes. Wireless sensor network is used with the scheduling which increases the network life-time for the extended period of time.

III. SYSTEM MO DEL

We are developing adaptive energy saving approach called ADP for wireless sensors to effective increase the network lifetime without introducing lots of data sensing report latency. ADP is designed to increase the network lifet ime and save on energy reduction by optimizing the duty cycle of the node. We mostly focus on producing an adaptive and energy -efficient scheduling approach for sensors to sense and report events. Based on the result ADP save the energy and good performance of the traffic.

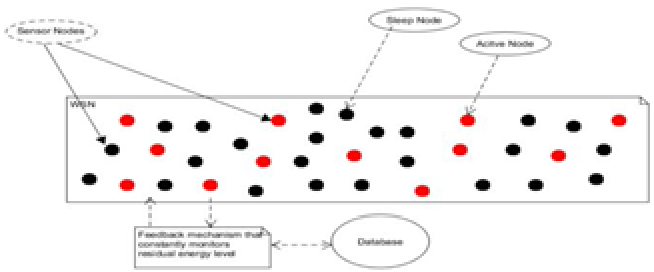

Figure 1. S YSTEM ARCHITECTURE

WSN Energy Model

The energy devoured by a sensor to transmit and get one byte, and power-amp lify each transmitted byte to cover the distance of 1 m are et m J; ermJandeamJ/ m2, respectively. The energy model is the primary request model shown as follows in [5]. Counting the packet header and body containing the sensed information, the consumed energy to transmit and get a packet of length h bytes over distant dare ET; ER.

ET = et _ h + ea _ h _ d2 (3.1)

ER = er _

IV. RESULT ANALYSIS

This system the wireless sensor nodes if alays then they work for 3 hrs. and if it will be done dynamically on/pf then it increases backup to8 hrs. Here we going to increase energy efficiency and decrees the traffic load

Always on network:

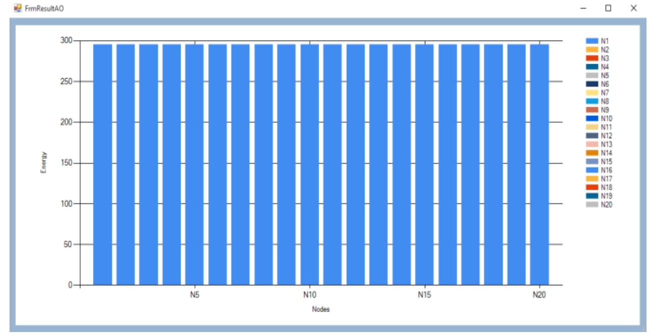

Figure 2. Always on network

Dynamic sleep/wakeup:

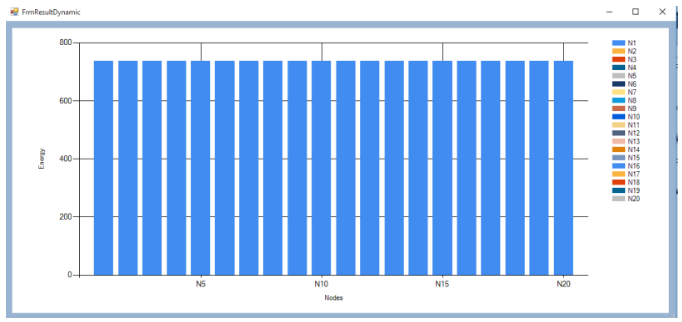

Figure 3. Dynamic sleep/wakeup

V. CONCLUSION

ADP obtains energy saving, high energy efficiency and great performance for latency over different traffic situation.

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