

Managing and Monitoring the Real-Time Data of Patient from Wireless Sensor Network

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Abstract—BSN body sensor network is a technology which senses the data from the human body and transfers the sensed data to the base station. Here the difficulty is like not processing the data but transmission of data from the sensor. Here the introduction of a protocol occurs to manage the transmission LEACH which is a cluster based routing and TDMA based MAC protocol, which helps the transmission of data through clustering the data of all sensors through CH. The data and network environment is going to be heterogeneous here which can be managed by LEACH. Impending to the database we are to use the two main approaches in order to manage and querying the data are warehouse approach and distributed approach. Here in order to monitor the patient in the both cases distributed approach and warehouse approach is used.

Keywords—LEACH –low energy adaptive clustering hierarchy, MAC- medium access control, TDMA – time division multiple access, CH – cluster head.

1 INTRODUCTION

The paper is based on the information computing technology to expand efficiency in the medical field the system proposed here is to manage and monitor the patient body using the conceptIoT Internet of things which provides the integrated computing system wireless communication technology and software with in it. The (body sensor network) BSN sensors is going to be deployed in or on the human body where by the sensor Patient observation is done manually by capture the physiological conditions of the patient such as pulse rate, temperature and blood pressure etc.

The patient's readings are recorded on the medical chart (dataset) provided for patients and the treatment plan is based on captured data. Information and computing technology ICT not only make the automation of the patient observing process possible and also significantly improve the process, that is going to sense the data based on the sensor emphasis from the body, and the data whatever been received from the sensor is to be store into the local microcontroller of the sensor and it is to transmit the data to the device which is going to monitoring the patient data and also the data is to be stored to the database system.

The database system plays a vital role here it is going to store the data where it is going to be a real time data there is some challenges to maintain the data where it is going to be huge data to be sensed and transfer by the sensor whereas the sensor cannot maintain the data because of the sensor has the span of life time is going to be less, it is going to transfer the data to the database server to store the sensed data.

The cases like the patient moving by an ambulance to be monitored and sensed data is to be verified by the doctor in

real time to that we are in the need of distributed database server to process the transmission. Here the challenge is like the data to be sensed and it is to be transmitted by the sensor in the immediate response. In further sections we are going to discuss about the things like

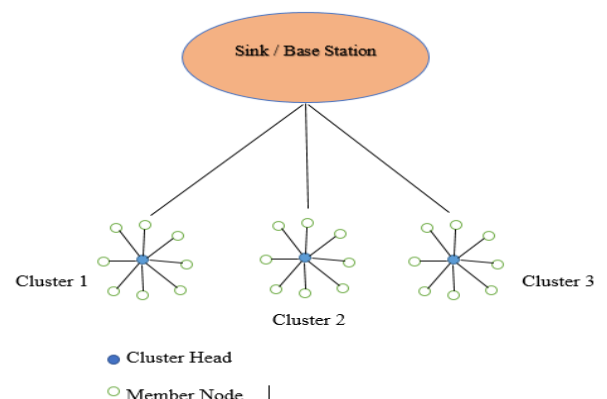
- The transmission of data from sensor.
- how the monitoring of the data to be done
- How the management of the data to be happened.

With some architecture models.

2 TRANSMISSION OF DATA FROM SENSOR

The BSN body sensor network is the technology which sense the data from the human body according to the sensors nature to transfer the data we incorporated a protocol leach, the leach is cluster based routing protocol shown in figure 1, which has the several processing techniques to transfer the data which saves the life time of the sensor and as well as the data transferring.

In the environment the group of sensors are to be deployed in the human body in that the sensor is to sense the data and has to transfer the data to the base station, the transmission is going to be in term of rounds, cluster head has the task to group the data sensed by the other sensors and aggregate it to transfer the data to base station. The CH cluster head is chosen for every round to transfer the data which has the high energy efficiency among all the sensors in the environment.



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Figure 1: Leach Protocol

The process will be repeated for every round of transmission; the cluster head will not act again as cluster head till p rounds p is calculated as per the number of nodes present in the environment.

3 MONITORING OF DATA IN WIRELESS SENSOR NETWORKS

The monitoring of the data that has been sensed by the sensor is to be done by the local server memory where it is said to be instant memory or the base station, shown in figure 2 where the data is to be monitored by ICT where it automates the process of monitoring data here the role of database is to run instant query and skew the data that has been received from the sensor according to the sensor id and position then further steps are to be carried out by ICT where it links up the data to the monitoring system.

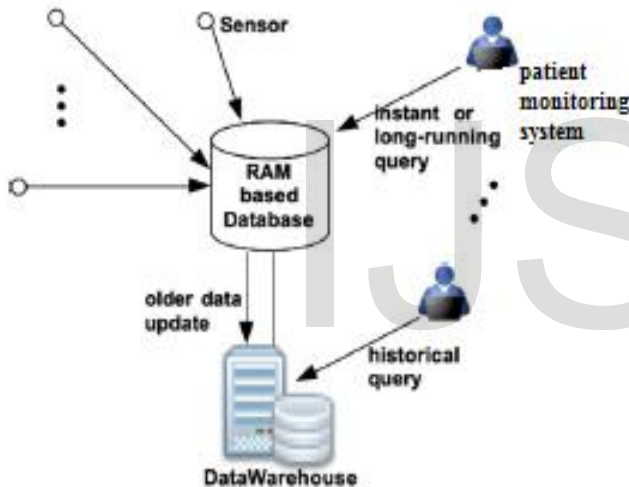


Figure 2: warehousing approach along with instant monitoring

Here the figure 2 shows the base station as ram based memory where the data instantly queried (discussed in further sections) by the monitoring system in continuous series to monitor the data.

The distributed approach of the data monitoring is to be done while the sensor is going to be a moving sensor in such cases the proxy interface is to be used for monitoring the data the process all to be done is same as the warehousing approach like accessing the data directly from the base station but the difference is to access the data from various geographical location through proxy interface i.e. said to be internet and data is to be stored in various location where the it is transferred and stored again by using the network services as shown in figure 3.

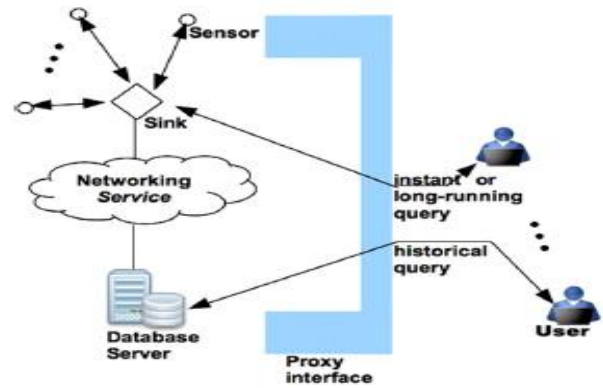


Figure 3: distributed approach with instant monitoring

Then the data is stored in the data warehouse were that part will be discussed in the further sections.

4 DATA MANAGEMENT ON WIRELESS SENSOR NETWORKS

The data management is the main issue for especially in the case of real time data due to the data size is going to be enamous as well as the sensitive and continuous data flow is to be occurred, in such case some special methods to be followed in case of managing data, here the two methods is to be involved to manage the data is 1. Database pointer approach and 2. Object oriented approach the both method will be discussed in these section.

4.1 Database pointer approach for database management

The pointers are the variables of the database which are used to access the data in the real-time.

```

1. Task patient(void)
2. {
    //initialization part
3. int tmp;
4. DBPointer *dbp;
5. Bind(&dbp , select * from patient
    where PID= 0001);
    // control part
6. While(1)
7. {
8. tmp=readPatientSensor();
9. Write(dbp,tmp);
10. WaitForNextPeriod();
11. }
12. }
    
```

Figure 4: simple IO task using database pointer

In figure 4 it shows the simple example of input and output task which often reads the data from the sensor and transmits the sensor data to the database. Using the database

pointer in the case of body temperature in the patient relation, which consists of the two parts initialization part (2-4 lines) it is executed when the system is started and a regular part (5-8) which scans the sensor data in real time. While initializing the database pointer will be created and limits the data element in the database, during the progress control in the figure 4 the function write will act and writes the value temp in the pointer. During this process the lines which are bounded performs the checking and synchronization with the data access with the same data section. Then the data writing is performed and the pointers can have bounded to single data or set of data elements depends on the association of the data with each other.

5 OBJECT ORIENTED APPROACH FOR MANAGING DATA

The real time database can be modelled by using the objects. Generally, the object of a field is predefined while the label and establishment of the monitoring system controller. The objects that are predefined types are organized.

In figure 5 shown the organized data in order in cause of retrieve the data efficiently the object is to be indexed by using the index the data can be assessed with the help of object id the objects are already set with an id before. Which is set for accessing the data which is corresponding to the object id which in Figure 6, the process has been illustrated. The time taken for the process is to be less while comparing to the other operations.

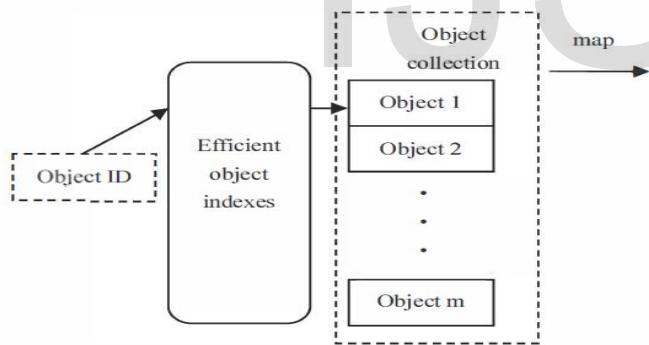
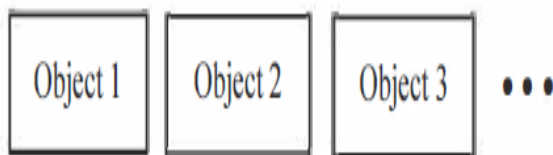


Figure 6: searching for object



Here in the figure 6 the process of indexing and reteriving of Figure 5: organized based on object

In further we can apply double index for the making our database more efficiently by foolwing the attribute based object concept which has been shown in the figure7. Here the attributes are being searched with the help of object id along with its type to construct the object has illustrated

here the following step are to be followed.

The objects of same type should contain same type of attribute like which is corresponding to the attribute type of its object.

The position of same attribute and object type are to be same, that is the attribute type corresponding to the object type is in the same position. As per consequence, the data can be accessed in real-time by using the object id which has the object type and attribute type in it as shown in figure 7.

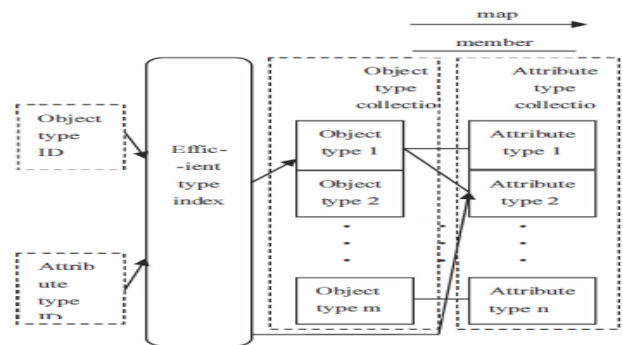
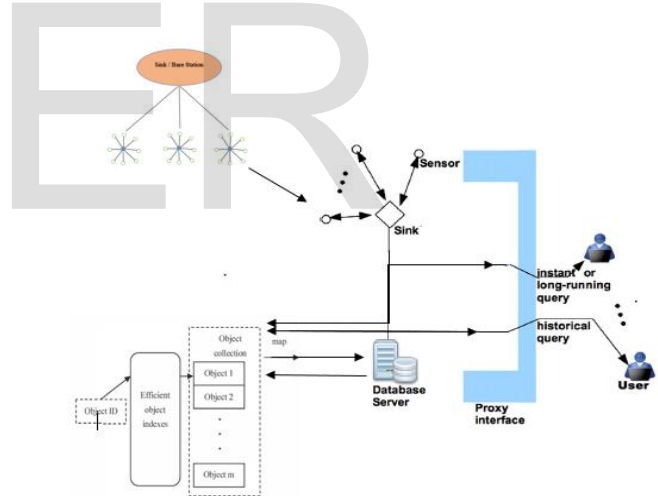


Figure 7: searching of attribute in an object type

6 SYSTEM OVERALL ARCHITECTURE



7 CONCLUSION

The performance of LEACH protocol has been evaluated here in the case of energy transmission of the data through clustering of all sensors and monitor the patient body in both distributed and warehouse approach. Its helps to make energy consumption by monitoring the patient in the remote manner as well as it will makes the patients to be monitor 24/7 without any difficulties.

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