Architectural Design of D2H Medicare

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Abstract:- As the technology increases the various attacks to the world also increases in form of diseases which cannot be cure in days. So they should be under the observation of doctor which will be some risk to the doctor for continuous observation. So to hold this condition we provide a system with an architecture of smart health protection using the WS Networking by which the sick people will be treated remotely and can be monitored without any interrupt. In this paper we are briefing about the working of this system, cons and pros of the system. This WS networking system will be designed by using the Adhoc Networking with deployment of sensors to get a good quality of the medical treatment with very less expenses for consulting.

Keywords: *WSN, E-Health, Remote Health surveillance, D2H*

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1. Introduction.

Presently the whole world population increases day by day so as increasing in population various diseases for the older people and younger people are increasing so to avoid such conditions we have to maintain the continuous monitoring of these people and should be treated from home itself so for this remote health care unit should be establish.[1] As a caretaker will be there then those will follow doctor instructions and then treat people. Many of researchers are investigated and then a design an architecture for smart health protection with the combination of computer, networking and biomedical fields.

This paper broadly says about how the health monitoring can be done in emergency cases like if a person's want immediate Medicare then through this system we can build a network instantly with Adhoc networks then remote health monitoring can be easily done. This type of system can be more advantageous in the older people who are continuously monitoring from home.[2]

2. Theme of Direct to home Medicare

Now a days the older people are feeling sick very quickly, then those should be monitored continuously by the medical people. As this will be risk process to avoid this we are building an Adhoc network to which all the nodes will be connected which provides a smart health protection system which diverges a very new opportunities and ways to monitor patient and can easily assist the caretaker if any emergency occur. By this system we can maintain a clear data about the patient condition time to time and the privacy can be maintained of the medical history of the patient. [6] Only the authorized persons can see the medical history of the particular patient. So by this system we can timely monitor multiple patients at a time and keep observation on the patient health habits.

As we are using Adhoc networks, we can maintain self-maintenance networks wearable sensors will be used and a good treatment can be given to the chronic diseased people. The network lifetime also increases easily. The system architecture is a multi-tier like server tier, user tier etc., will be there with combination of various devices are connected with the mesh network. To these nodes very light weight sensor will be used. The motes which we are using are manufactured by Mote works, and the name of the mote we are using is MICAZ MSB 300.

Fig 1: Mica Z MSB 300

3. Overview of the System:

The Medicare system immerges with various devices like devices which are placed inside of the patient`s body. So these sensor will provide all the health condition

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information of the patient. [3] So all the data will be collected, processed, aggregated and will stored in the doctor`s server. To connect all these a smart gateway will be used by the health care providers. [4] So the networks sometimes may be mobile, the life time of the sensor will depend on the battery. The main components of the devices will be shown below which are of two types one is physical interconnection and the networking based connection.

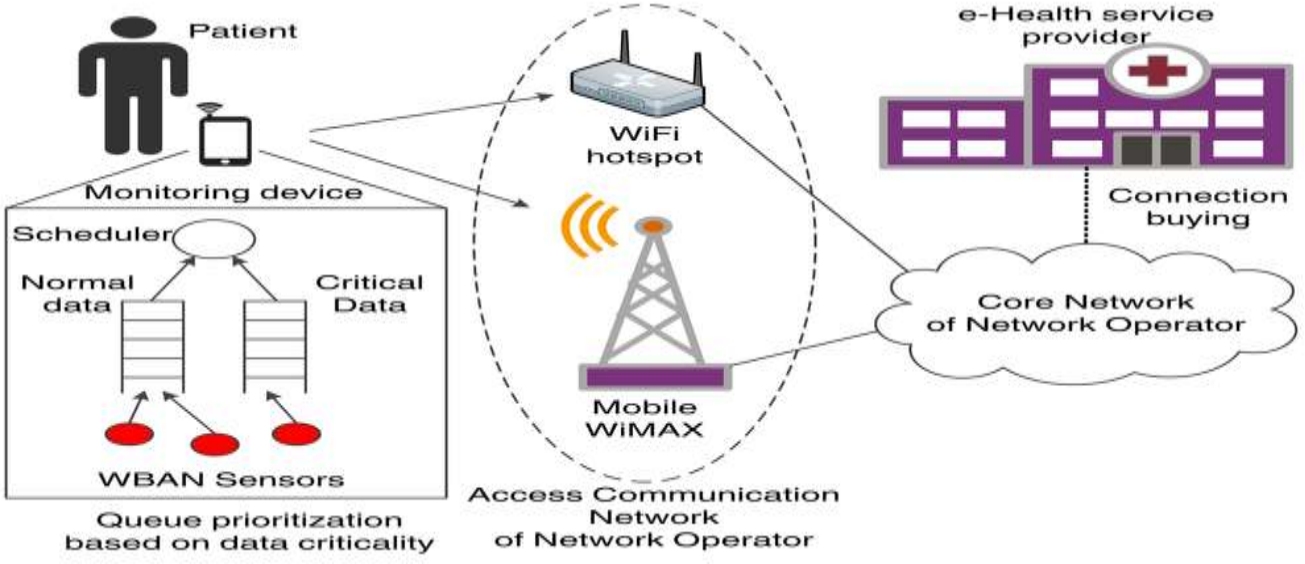

Fig 2: Architecture of D2H Medicare.

The main subsystem present in this architecture is as below

a. WBAN subsystem

This subsystem consists of various small components which are portable and various sensors are immerged on it. As these devices are small they are battery operated where we can get more network life time and the energy consumption will be low. The sensors or actuators used in WBAN are able to make communications self with others. In this one node sensor will acts as head and form a cluster head for proper availability of gateway purpose. So, these can communicate by themselves with various routing algorithms/protocols. As to maintain the data of sensors these node will have some memory unit as a storing capabilities.

b. Layout of Sensors

The sensors are deployed at various positions to sense and continuous monitoring of the patient remotely by the Medicare people. Monitoring of different parameters like temperature, heart rate, BP etc. With the help of these parameters analysis and data association can be done stored at the backbone. These sensors communicate with each other using various multi hop routing protocol. This will save more patients information in the database. How these BAN will connect to the nodes through wireless in fig4.

Fig 3: Layout of sensor in the WBAN

c. Network database

The Network database contains one backbone where the sensing data of the sensors through the traditional systems like Computers, database server etc. It will create fastest relay for routing from one sensor node to other sensor node. With this we can also maintain the location based services and questionnaire which leads to low cost for routing.

d. Database Management at B-end

For maintain the database of various sensors of the node for long time storage and for data mining. All the data will be stored at the network database.

e. Anthropoid Interfacing

Interface of human with the network with the help of PC, wearable devices which are for the database management, location based services, memory aids etc. With these data we can get the alerting the caretaker when any emergency occurs.

4. Implementation of D2HMC

To design this system we require some parameters use and to construct the architecture. The requirements are shown below [5]

1. Information from sensors acquisition
2. Infrastructure build for usage of current backbone
3. To maintain the database
4. GUI

4.1. Information from sensors acquisition

In this we have various sensor like motion sensor which is of low-cost module used for the detection of motions and ambient light level of the patients. This sensor will capture the whole information and will be further processed through the wireless communication network. For this we will deploy a set of sensor module in the room. The second device is BAN- which is implemented on the wearable sensors which are embedded on the MICA Z MSB 300 mote through we can record the human activities and location through the MEMS sensor and GPS navigator. [7-13]. These data will be compared periodically. Bed sensor will be used for the measurement of breathing rate, heart pulse of the patient periodically.

SYSTEM REQUIREMENTS

Requirements	Operational Yes/No
Query management	Yes
Power management	No
Authentication	Yes
Data privacy	No
Multiple patients	No
Real-time (delays < 0.3sec)	Yes

Table 1: Requirement to construct the D2HMC

4.2. Infrastructure build for usage of current backbone

The current backbone will acts as a gateway for the motes deployed at different places in the home environment.[13] A ZigBee protocol will be used for the transfer of data from home to nurse/medical people.

4.3. To maintain the database

The database will be maintained at the backend, stores the data and will be further processed. The data coming from the infrastructure and the offline analysis will be stored and checked periodically.

4.4. GUI

The Graphical user interface is the in which we can show graphical analysis of various parameter like position of the patient, heart rate, temperature, humidity etc. In this system we use different GUIs. [14] One is at the nurse station, second is at the caretaker who will continuously monitoring, third will be placed on the mote itself to show the reading of the various sensor. The fourth will be at the doctors to know the exact behavior of the patient. The GUI graphical analysis shown in the below figure

Fig 4: GUI shows graphical analysis of various parameters.

5. Results:

Here we are deployed many sensors at various places in the room these motes will be communicated in bidirectional way, these motes are interlinked through multi hop routing. In such case the use of network life time will be very less and the energy consumption is also very less. The values which we are getting from these sensor are very accurate no false detection of sensed vales will occur.[15]

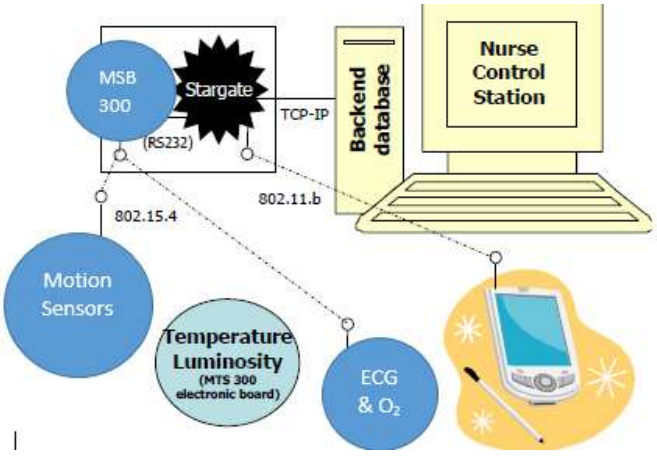

Fig 5: Monitoring system at Nurse Control station.

6. Conclusion

In this paper we explained briefly how the WS networking is interfaced with the medical part for the continuous monitoring of the patient from home itself. Time to time every condition of the patient are compared with the previous analysis, if any situation went wrong then immediate treatment will be given through this system. The further work will be continued on integration of multi modal data association and on multiple residents. The data integrity is maintained with high security and privacy.

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