Scientific Journal of Impact Factor (SJIF): 4.72

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 4, Issue 5, May -2017

Patient Health Management System Using E-Health Architecture in Wireless Sensor Networks (WSN)

[1]Sameer Sham Jewalikar, [2]Prof.S.N.Uke, [3]Prajakta Kumbhar,
[4]Payal Dhawale, [5]Geeta Khandgaure

[1,2,3,4,5] *Smt.Kashibai Navale College Of Engineering,Pune*

Abstract —*Healthcare is the most important concern of many countries in the world. Improving the lives of patients, especially in weaker parts of the society, which includes elderly, physically and mentally disabled as well as chronologically ill patients is the most important factor that needs to be improved. E-health systems depending on modern technology play a vital role in eradicating these problems. Lot of advancement has been done in order to improve the systems. This paper illustrates the proposed system which uses mobile devices and WSN's for real time monitoring and analyses of patient's health parameters and in return provide medication. The system makes it easy for doctors and caregivers to immediately act in emergency cases and also provide medication depending on health parameters without the actual presence of doctor. The system is such that remote monitoring of patients can be done by diagnosis of the patients can be done by diagnosis of the patient with the help of environmental and medical sensors. The sensors monitor the health of the patient and in real time collected data is sent to server via the patients smartphone. The data is received by doctors and caregivers through server which is analysed by the doctors and accordingly medication is provided back to the patient. The medical history of the patient is stored on cloud for future reference. Also there is a android application which has a chat module through which the doctor and patient can interact with each other. The system architecture is such that the patients can be monitored and treats privately at home. Also the system helps in handling multiple patients simultaneously.*

Keywords:*WSN,Raspberry-pi,API,GSM, Sensors.*

I. INTRODUCTION

WSN's are emerging in recent years and are used in many applications like military, health, etc. An important application of WSN is the health monitoring systems. With the ageing population around the world, research into health monitoring applications has gained prominence over the years [1].

Body sensor network systems can help people by providing healthcare services such as medical monitoring, memory enhancement, medical data access, and communication with the healthcare provider in emergency situations through the SMS or GPRS [2]. In the proposed system, using WSN and mobile devices the monitoring of patients can be achieved. Different environmental and medical sensors are available, and using those sensors the patient's diagnosis is done. The efficiency of the system is dependent on the quality of sensors used and its sensing capability.

The system is useful in many scenarios. First, in case of elderly people, since old people need regular health monitoring, this system is very useful for them. Second, in the weaker parts of society where there are less hospital services, this system can be deployed in those parts so that many people can use it. Third, the patients who are handicap or the ones who cannot visit doctor regularly. Fourth, the patients who are critical and need regular monitoring of the disease. Therefore, considering the above cases, we have developed this system so that it will ease the process of medication for people.

II. LITERATURE SURVEY

Sr. No	Paper Name	Published Year	Author	Description
1	[3]Healthcare Monitoring System Using WSN with GSM	2015	Sunil L. Rahane, Prof.Ramesh S. Pawase.	This paper uses mobile phones for patient monitoring and communication. But, the system do not maintain the database.
2	[4]ZigBee Based Wearable Remote Healthcare Monitoring System For Elderly Patients.	2014	Khalifa AlSharqi,Abdelrahim Abdelbari,Ali Abou-Elnour and Mohammed Tarique.	This paper proposes the ZigBee Protocol and monitoring is done by that. But this approach can monitor patient Within 100 Meter range only.
3	[5]Using Heterogeneous WSN's in a Telecommunication system for Healthcare.	2010	J. M. Corchado, J. Bajo, D. I. Tapia and A. Abraham	In this paper, the SLYPH(service layer over light physical devices) technology is used. But this methodology has issues like implementation in home is very difficult
4	[6]Bluetooth-enabled in-home patient monitoring system: Early detection of Alzheimer's disease	2009	H. T. Cheng and W. Zhuang	. In this paper, the systemconsists of 2 components: In home Patient Monitoring & Uses Bluetooth Communication Device. But not feasible when Patient Moves beyond coverage area.

Table 2.1: Literature Summary

III. PROPOSED SYSTEM AND WORKING

In the architecture diagram, the systems architecture is shown. There are different layers in the system. The first one is the sensor layer. We have used three sensors, out of which one is environmental sensor (temperature sensor) and the other two are medical sensors (Oximeter and pulse sensor).

The next layer contains the processing unit. Raspberry pi is used to process the data that is sensed by the sensors. Patient data is processed and sent to next layer i.e. the patients handset. From the handset of the patient, the processed data of the patient is sent to the cloud. On the cloud, patient's history is stored.

The service management layer accesses the cloud and it sends the data to the next layer. Also the database is maintained by the service management layer. The next layer are the services like hospital service, emergency service and out source service

as it can be modified and stored back on the server. Also there is a chat module as shown in fig. 1 which is a communication link between the doctor and patient. The doctor can prescribe medicines to the patient through this chat module, also it will be stored on the server. The emergency response system will act when the patient's sensory data is beyond threshold. A message will be sent to the relatives and to the ambulance in case of emergency.

The service management layer will send the data according to the situation to the further layers. The communication between cloud and service management layer is duplex in nature. The data accessed from cloud as well.The system

works in following six modules. The first one is embedded module which is used to build data with sensor and send it to mobile via WiFi

The next module is mobile application, in which there are activities like login of patient, patient registration, collection of sensor data, chat with doctor, show all sensor data. When we login into the application we can retrieve our health .

The health history is stored with the sensor values & time.

Also,we can chat with the doctor using chat module. The patient can update their profile & can change the contact numbers also.The patient can get all the medicines prescribed

by the doctor & also report is generated can be viewed.

The third module is web portal side. In this, there is a admin who manages the database with activities like Add/Delete patient. Then there is Doctor who will analyze the patient and prescribe medicines to patient. Also the emergency response system is a part of web portal side.The doctor can chat with the patient & can elaborate about the problems more skillfully.

Also doctor has the facility to plot the gaphs using the sensor values.

IV. SYSTEM ARCHITECTURE

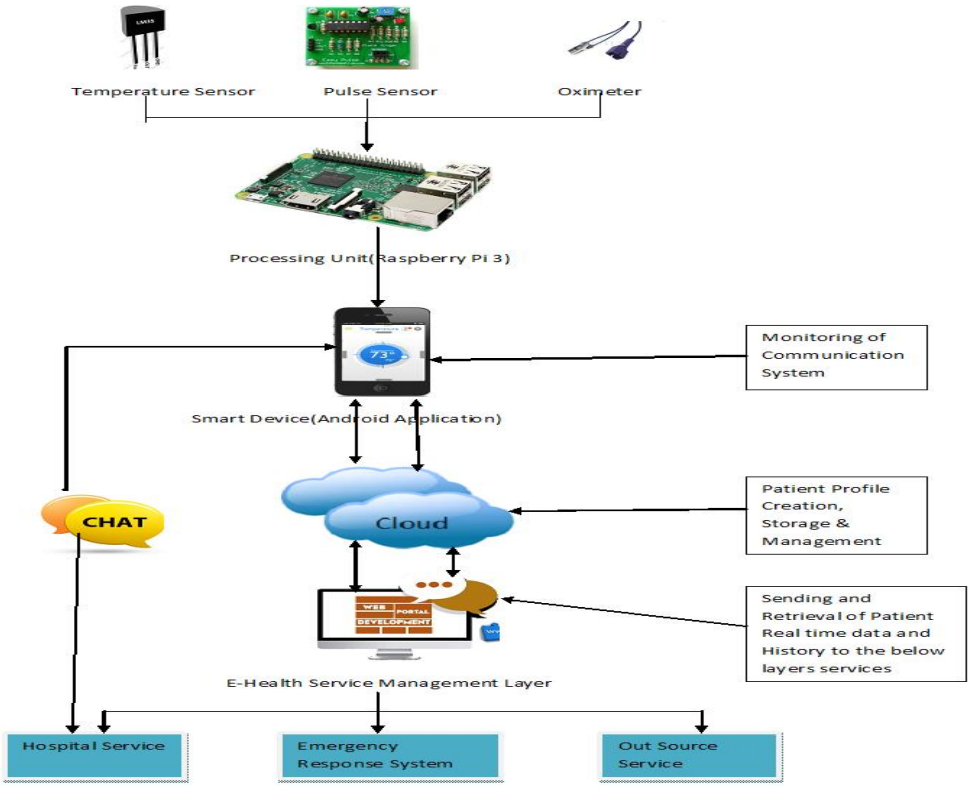

Fig. 1 System Architecture

V. MATHEMATICAL MODEL AND ALGORITHM

System Specification:

S= {S, s, X, Y, T, f_{main}, DD, NDD, f_{friend}, memory shared, CPU_{count}}

S (system):- Is our proposed system which includes following tuple.

s (initial state at time T) :-GUI of Patient Health Management System using e-Health Monitoring Architecture using WSN. The GUI provides space to enter a query/input for user.

X (input to system) :- Input Query. The user has to first enter the query. The query may be ambiguous or not. The query also represents what user wants to search.

Y (output of system):- List of URLs with Snippets. User has to enter a query into Patient Health Management System using e-Health Monitoring Architecture using WSN then Patient Health Management System using e-Health

Monitoring Architecture using WSN generates a result which contains relevant and irrelevant URL's and their snippets.

T (No. of steps to be performed):- **6**. These are the total number of steps required to process a query and generates results.

f_{main}(main algorithm) :- It contains Process P. Process P contains Input ,Output and subordinates functions. It shows how the query will be processed into different modules and how the results are generated.

DD (deterministic data):- It contains Database data. Here we have considered IMI Database to decide threshold values for patients heath status

NDD (non-deterministic data):- No. of input queries. In our system, user can enter numbers of queries so that we cannot judge how many queries user enters into single session. Hence, Number of Input queries are our NDD.

f_{friend} :- WC And IE. In our system, WC and IE are the friend functions of the main functions. Since we will be using both the functions, both are included in f_{friend} function. WC is Web Crawler which is bot and IE is Information Extraction which is used for extracting information on browser.

Memory shared: - Database. Database will store information like list of receivers, registration details and numbers of receivers. Since it is the only memory shared in our system, we have included it in the memory shared.

CPU_{count}: - 2. In our system, we require 1 CPU for server and minimum 1 CPU for client. Hence, CPU_{count} is 2.

DP is used for comparing incoming patient health data with threshold values.

Subordinate functions:

Identify the processes as P.

S= {I, O, P....}

P= {GPD, TC}

GPD is Gather patient health data.

TC for threshold checking.

P is processes.

GPD= {U, MAX, CV}

.Where,

U= Data from Sensor mounted on patient.

MAX = {1, 2, 3, …, n}

CV is for sending gathered data to Doctor.

TC = {CV, DP, Info}

Where,

CV is input which is taken from GPD

Algorithm:

Step 1:Login Patient

Step 2:Gather Patient Data

Step 2.1:Connection established between Mobile and Sensors

Step 2.2 : Heath data gathered by sensors.

Step 2.3 : Data collected from sensors.

Step 2.4 : Data sent to Doctor.

Step 3: Doctor Login

Step 4: Show Patients List

Step 4.1 : Show Patient Health History

Step 4.2 : Chat with Patient

Step 4.3 : Patient Health History in Graph

Step 5: Check patient health data with threshold values.

Step 6: Stop

VI. CONCLUSION

Patient health management system using E-health monitoring architecture in WSN uses mobile devices and wireless sensor networks for real time monitoring and analysis of the patient's healthparameters and in return provides medication. It is easy for doctors and the caregivers to immediately act in emergency cases, and also to provide

medication depending on the health parameters without the physical presence of the doctors with Patients real time and historical Details and also provide emergency SMS on stored contact details of the Patient.

As future work, we intend to 1) provide this system for development of the smart cities. 2) include many machine learning features which can automate the process and will increase the efficiency.

VII. RESULT ANALYSIS

7.1 Result Analysis:

1. **Requirement gathering and analysis:**

   In this step of waterfall we identify what are various requirements are need for our project such are software and hardware required, database, and interfaces.

2. **System Design:**

   In this system design phase we design the system which is easily understood for end user i.e. user friendly.
   We design some UML diagrams and data flow diagram to understand the system flow and system module and sequence of execution.

3. **Implementation:**

   In implementation phase of our project we have implemented various module required of successfully getting expected outcome at the different module levels.
   With inputs from system design, the system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality which is referred to as Unit Testing.

4. **Deployment of System:**

   Once the functional and non-functional testing is done, the product is deployed in the customer environment or released into the market.

Acknowledgment

We might want to thank the analysts and also distributers for making their assets accessible. We additionally appreciative to commentator for their significant recommendations furthermore thank the school powers for giving the obliged base and backing.

REFERENCES

[1] S Mukherjee, K Dolui and S Datta, “Patient Health Management System Using E-Health Monitoring Architecture,”, Electronics and communication engineering, St. Thomas’ College Of Engineering, Kolkata, India and Mobile Communication Department, Biot, France, 2015.

[2] Media Aminian and Hamid Reza Naji “A Hospital Healthcare Monitoring System Using Wireless Sensor Networks,”, Department of Computer, Science and Research branch, Islamic Azad University, Kerman, Iran and College of Electrical and Computer Engineering, Kerman Graduate University of Technology, Iran, vol 4,2013

[3].Sunil L. Rahane,,Prof.Ramesh S. Pawase, “Healthcare Monitoring System Using WSN with GSM”, vol. 4, no. 7, pp. 2320– 3765, Jul. 2015.

[4] Khalifa AlSharqi,Abdelrahim Abdelbari,Ali Abou-Elnour and Mohammed Tarique., “ZigBee Based WearableRemote Healthcare Monitoring System For Elderly Patients,”in IJWMN vol.6,no.3,Jun, 2014.

[5] J. M. Corchado, J. Bajo, D. I. Tapia and A. Abraham, "Using Heterogeneous Wireless Sensor Networks in a Telemonitoring System for Healthcare," in *IEEE Transactions on Information Technology in Biomedicine*,vol.14,no.2,pp.234-240, March 2010.doi: 10.1109/TITB.2009.2034369

[6] H. T. Cheng and W. Zhuang, "Bluetooth-enabled in-home patient monitoring system: Early detection of Alzheimer's disease," in *IEEE Wireless Communications*, vol. 17, no. 1, pp. 74-79, February 2010. doi: 10.1109/MWC.2010.5416353

