Global Journal of Advanced Engineering Technologies Volume 5, Issue 4- 2016
ISSN (Online): 2277-6370 & ISSN (Print):2394-0921

REMOTE PATIENT MONITORING SYSTEM USING WIRELESS SENSOR NETWORKS

[1]Prof. C. S. Patil1, [2]Miss. Pranali A. Kharche
[1]Head of Department, Electronics and Telecommunication, S.G.D.C.O.E.,Jalgaon India
[2] Student, Shri. Gulabrao Deokar College of Engineering Gate No.56, Shirsoli Road, Jalgaon, Maharashtra India.

Abstract: *In current system wearable health-monitoring systems especially in enabling the non-invasive diagnosis of vital functions of the human body. Besides typical singular heartbeat or perspiration sensors, which have been available in recent years, the deployment of a series of body-worn sensors can enable an effective health-monitoring mechanism. The combined information get from such systems can either be relayed to any health-monitoring personnel in the case of emergencies or in logged and analyzed as a part of preventive health measures. they are interfere with the patients' regular movements. This is especially challenging because there is the relationship between the electromagnetic waves and patients are influenced by the patient's movements, distance from the nearest base station, operating environment, etc. that we are use the sensors to get measurement of patient body. in that system we are using microcontroller for sending measurements. in Additional challenges to the deployment of such system are also faced in situations .where these body part nodes require additional space on-body , impose additional weight, or are not conformal enough to the patient's body. by using hardware's patient check and send measurements and after checking doctors get decision and send message to the patient. This article aims to review the latest developments in body-worn wireless health-monitoring.*

Keywords— *ECG, sensors, health monitoring, Measurements, base station, C 4.5 algorithm*

I. INTRODUCTION

In current system patient want to go in hospital for check up when they have some problems or some diseases. And mostly It's not possible for older persons because and sometimes it's dangerous for them because sometimes get late in that all processes. Hence, In order to overcome this problem we are going to develop an application to overcome all these problems. The goal of Wireless Health Monitoring System is to develop a low cost, low power, reliable, non-intrusive, and non-invasive vital signs monitor which collect different type of body parameters are wireless transmitted to a health care professional[1]. The main part of our project is to take a sensing data conditioning system to acquire accurate heart rate, ECG, blood pressure, and body temperature measurement [2]. After processing of data we have to find a proper method of transmission and signal display. Even though the patient is not in dangerous situation, the doctors would need to confirmation of their health. In recent times, the expenses for hospitalization and medical care are unimaginably high and expensive for some persons. Wearable health monitoring systems allow an individual to closely monitor changes in her or his Measurements and provide feedback help to maintain an optimal health status of patient [3]. If integrated into a tele-medical system, these systems can even alert medical personnel when life-threatening changes occur. In this Wireless health monitoring system there are many sensors are use to take a different measurement of body like heart rate, ECG, blood pressure, and body temperature readings etc. in this system we are use microcontroller for transmit all these data or measurements to web application by using wireless transmission. Which may then be displayed on a user interface or transmitted to a medical center[4]. All these data received by doctor or specialists and then doctors check record and take decision like witch medicines are required to patients. Check the status of patients and send decision or other important information to the patient. for that we are using different algorithms for signal processing, ECG for Health monitoring[3]. in this wireless health monitoring we are use cyclic algorithm for to convert voltage to analog signal. and automatically alerts health-care personnel when an emergency occurs. In addition, they are also able to alert the individual in case of possible imminent health threatening conditions.

II. RELATED WORK

Recently many authors proposed different methods for confirming security in patient monitoring systems. Wireless health monitoring system (WHMS) has drawn considerable attentions from the research community as well as industry during the last decade. Day by day increasing research and development efforts have been

posted in the literatures. We have limited this effort to include only some of the very recent related works.

Seyyed Mohammad Reza Farshchi develops fuzzy logic expert system. The computerized system stores each prescription or administration as a separate record which is linked to a unique patient number [17]. Each user has a different unique Identifier number. Individual users identified using this number. The system generates warning using the rules designed into it and maintains a record of every occasion a message is displayed. Each message can be linked to the individual user whose action is generated it, to the individual prescription.

Fuzzy expert system can be pursued using the following steps.

- *Select input and output parameters. Determine the number of semantic terms associated with each input/output parameters.*
- *Choose the specific type of fuzzy inference system. In most cases, the inference of the fuzzy rules is carried out using the min and max operator for fuzzy intersection and union.*
- *Design a collection of fuzzy knowledge base to formulate the initial rule base, the input space is divided into multidimensional partitions and then action is assigned to each of the partitions.*

Ms. Amruta Nagarkar develop patient monitoring systems are gaining their importance as the fast-growing global elderly population increases demands for caretaking [12]. This paper tells about the wireless sensor network based on ZigBee technology. Zigbee technology mainly used for collecting and transferring the different many more monitoring information about the patients in hospitals or in their homes. It is mainly used to monitor various parameters of human body like pulse rate, ECG, temperature and triaxial accelerometer movement of the patient.

Marco Mercuri develops health monitoring system. It consists of a sensor, combining both radar and wireless communications features, and a base station for data processing [16]. A radar will be generated a waveform and sent to the target, and then its reflected echo, containing speed and absolute distance information, is collected by the receiver. The result of radar is baseband signals are digitized and transmitted using wireless to a base station that consists of a Zigbee module, a laptop, and a microcontroller. The latter collects and transfers the data received of the Zigbee module on the laptop to determine remotely the final absolute distance and to distinguish a fall event from normal movements (e.g., walking, sitting down). The data processing is not performed by the sensor to avoid complex processor on board to reducing costs, size, and also energy consumption. Moreover, this represents a flexible solution if multiple sensors will be used. In fact, the base station should combine and process multiple information at the same time.

P.Karthick, C.Suresh kumar, P.Arun prasad, S.Puspa raj developed embedded based real time patient monitoring system designed for monitor the patient is in any place [11]. The system is continuously monitor physical parameters like temperature, heartbeat, ECG, blood sugar, and compare it with the predetermined value set and if these values cross a particular limit it would automatically alert the alarm to doctor via a SMS. This system provides a continuous health monitoring service. The data processed are transmitted by Zigbee wireless. The received data is sent to the laptop. The graphical user interface programs on the laptop are coded using Keil C, Using GSM message is transmitted to the doctor mobile number when the measured temperature exceeds the allowable value or if the pulse measured is abnormal.

Hsu Myat Thwe, Hla Myo Tun develops Patient Health Monitoring Using Wireless Body Area Network is to propose a wireless sensor network system in which both heart rate and body temperature of multiple patients can monitor on PC at the same time via RF network[7]. This existing system prototype system includes two sensor nodes and receiver node (base station). These sensor nodes can transmit data to receiver using wireless RF transceiver module. The RF transceiver module is used to transfer the data from microcontroller to PC and a graphical user interface (GUI) is developed to display the measured data and save to database.

Such a wireless sensor network system is suitable to be used in multi-specialist hospitals to reduce human errors, to reduce health care cost, to provide more time to health professionals with other important issues. Data of the patients are to be measured and monitored with the help of this system. The data that is measured by these sensor nodes is sent to a base station using radio frequency communication. The communication between the nodes and the base station can be a single hop communication a depending on the remoteness of the sensor node. The base station also controls the overall network. On every sensor node there are multiple hardware components. Many other components are used for signal processing purpose to take the sensor output signal in proper form and for

proper power supply is necessary for main components. The components required for this purpose are voltage regulators, Amplifiers, resistors and capacitors.

III. EXISTING SYSTEM

In Existing system patient want to go in hospital for check up when they have some problems or some diseases. And mostly It's not possible for older persons because and sometimes it's dangerous for them because sometimes get late in that all processes. Hence, In order to overcome this problem we are going to develop an application to overcome all these problems. The goal of Wireless Health Monitoring System is to develop a low cost, low power, reliable, non-intrusive, and non-invasive vital signs monitor which collect different type of body parameters are wireless transmitted to a health care professional. The main part of our project is to take a sensing data conditioning system to acquire accurate heart rate, ECG, blood pressure, and body temperature measurement. After processing of data we have to find a proper method of transmission and signal display. Even though the patient is not in dangerous situation, the doctors would need to confirmation of their health. In recent times, the expenses for hospitalization and medical care are unimaginably high and expensive for some persons. Wearable health monitoring systems allow an individual to closely monitor changes in her or his Measurements and provide feedback help to maintain an optimal health status of patient. If integrated into a tele-medical system, these systems can even alert medical personnel when life-threatening changes occur.

IV. PROPOSED SYSTEM

In proposed system of Wireless health monitoring system there are many sensors are use to take a different measurement of body like heart rate, ECG, blood pressure, and body temperature readings etc. The block diagram of wireless health monitoring is shown below:

These measurements are very important to send to the doctors. In this system we are use microcontroller for transmit all these data or measurements to web application by using wireless transmission. Which may then be displayed on a user interface or transmitted to a medical centre? All these data received by doctor or specialists and then doctors check record and take decision like which medicines are required to patients. Check the status of patients and send decision or other important information to the patient.

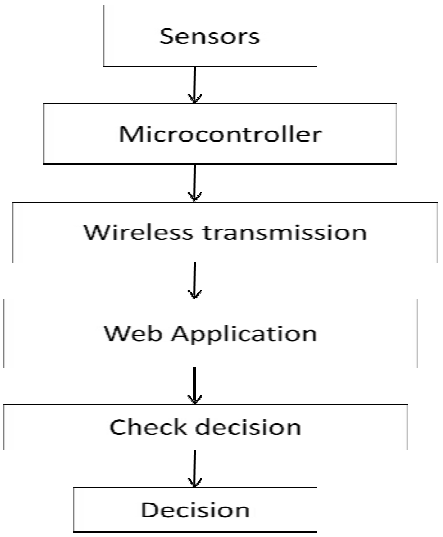

Figure 1: Block Diagram of wearable health Monitoring

For that we are using different algorithms for signal processing, ECG for Health monitoring. in this wireless health monitoring we are use cyclic algorithm for to convert voltage to analog signal. and automatically alerts health-care personnel when an emergency occurs. In this system we are using naïve bayes algorithm for classification of the given measurements. And j48 algorithm for decision tree in the wearable wireless health monitoring system. In addition, they are also able to alert the individual in case of possible imminent health threatening conditions.

V. ALGORITHM

C4.5 algorithm is used in our System which can be used for classification problems. It improves (extends) the ID3 algorithm by dealing with the both continuous and discrete attributes in that algorithm, missing values and pruning trees are given after construction. Its commercial successor is C5.0/See5, a lot faster that C4.5, more memory used for building smaller decision trees.

In this algorithm, it requires a set of training examples and each example can be seen as a pair input of measurements and give the desired output value to patient. The algorithm analyzes and takes decision on the basis of training set on the measurements of body part and builds a classifier that must be able to correctly classify both the training and test part. A test example is an input of a given body part records and the algorithm must predict an output value as an decision to the patient.

The classifier used by C4.5 is a decision tree algorithm and this tree algorithm is built from root to leaves by respecting the results. We should show the simpler solution.

The base cases are:

- *All the examples from the training set are given from same patient.*
- *The training set of measurements is empty (returns failure).*
- *The attribute list is empty (returns a leaf labeled with the most frequent class or the disjunction of all the classes).*
- *The Measurements values with the highest information taken is computed using the following formulas:*

Entropy:

$$E(S) = \sum_{i=1}^{n} -\Pr(Ci) * \log_2 \Pr(Ci)$$

Gain:

$$G(S,A) = E(S) - \sum_{i=1}^{m} \Pr(A1)\, E(S_{A1})$$

Where,

- *E(S) – information entropy of S*
- *G(S,A) – gain of S after a split on attribute A*
- *n – nr of classes in S*
- *Pr(C_i) – frequency of class C_i in S*
- *m – nr of values of attribute A in S*
- *Pr(A_i) – frequency of cases that have A_i value in S*
- *E(S_{Ai}) – subset of S with items that have A_i value*

Advantages & disadvantages:

The advantages of the C4.5 are:

- *Builds models that can be easily interpreted*
- *Easy to implement*
- *Can use both categorical and continuous values*
- *Deals with noise*

The disadvantages are:

- *Small variation in information collected by patients can lead to different decision trees (especially when the variables are close to each other in value)*
- *Does not work very well on a small training set.*

VI. CONCLUSION

A wireless communication system is designed and developed for older person or emergency patient monitoring. The primary function of this system is to monitor the heartbeats of a patient's body. In this proposed system transmitting module continuously reads patient's heartbeats through a digital pulse sensor, and sends it to the microcontroller which transmits the encoded serial data over to the web Application. At the receiving end, a receiver is used to receive the data, decode it and feed it to another microcontroller which is then provide to the doctors or hospitals. The receiver module is kept in the doctor's chamber to continuously display the patient's heartbeats wirelessly. This paper presents a newly designed integrated wireless monitoring system that supports real-time data acquisition from wireless sensing units. The selected wireless transceiver consumes relatively low power and supports long-distance peer-to-peer communication. In addition to hardware, multithreaded software is also designed as an integral component of the proposed wireless monitoring system. A direct result gain by the doctor is the multithreaded software paradigm and which is a wireless sensing unit. This is capable of data collection, data interrogation and wireless transmission. These result or decisions are sending to the patient. In that we are use c4.5 algorithm for decision tree.

REFERENCES

[1] M.P.N irmala, Rampriya Mahendran," Home Based Wireless Health Monitoring System", Volume 2014,pp. 13207- 13211

[2] Amna Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-ElNour, and Mohammed Tarique ," Real Time Wireless Health Monitoring Application Using Mobile Devices", Volume 2015,pp.65-70.

[3] Rajasekaran.S, Kumaran. P ,Premnath .G,Karthik. M," Human Health Monitoring Using Wireless Sensor Network(WSN)", Volume 2013,pp. 323-330.

[4] Manisha Shelar, Jaykaran Sing H, Mukesh Tiwari," Wireless Patient Health Monitoring System", Volume 2013,pp.1-5.

[5] K.C. Kavitha, A.Bazila Banu," Wireless Health Care Monitoring", Volume 2014,pp. 2417- 2422.

[6] Ms. Poonam Agrawal,Prof. S. P. Hingway,, Prof. B. P. Dharaskar," Innovative Approach for Wireless Health Monitoring System Using Client-Server Architecture", Volume 2013,pp. 1343- 1348.

[7] Hsu Myat Thwe, Hla Myo Tun," Patient Health Monitoring Using Wireless Body Area Network", Volume 2015,pp. 364- 368.

[8] Mrunali M. Lambat, Santosh C. Wagaj," Health Monitoring System", Volume 2013,pp. 247- 250.
[9] R.Suji Pramila, Shajin Nargunam," A Survey On Effective in-Home Health Monitoring System"Volume 2013,pp. 15-19.
[10] Harshavardhan B, V.M. Umale.," Wireless Biomedical Parameter Monitoring System", Volume 2015,pp.46-48.
[11]P.Karthick,C.Sureshkumar,P.Arunprasad,S.Puspar aj,M.Jagadeeshraja,N.SuthanthiraVanitha," Embedded Based Real-time Patient Monitoring System",Volume 2014,pp.773-777.
[12] Ms.Amruta Nagarkar, M.N.Kakatkar," ZIGBEE BASEDWIRELESS PATIENT MONITORING",Volume 2013,pp. 304-308.
[13] Alumona T.L, Idigo V.E, Nnoli K.P," Remote Monitoring of Patients Health using Wireless Sensor Networks (WSNs)", Volume 2014,pp.90-95.
[14] Sunil L. Rahane, Ramesh S. Pawase," A Healthcare Monitoring System Using Wireless Sensor Network with GSM", Volume 2015,pp. 6330- 6335
[15] Media Aminian and Hamid Reza Naji," A Hospital Healthcare Monitoring System Using Wireless Sensor Networks", Volume 2013,pp.1-6.
[16] Gokarna Pandey,Peter Karsmakers, Guy A. E. Vanden bosch, "Analysis of an Indoor Biomedical Radar-based System for Health Monitoring",2013,pp.1-8.
[17] Seyyed Mohammad ,Reza Farshchi," fuzzy logic expert system",2011,pp.2106-2110.