

Analysis of Various Techniques Used For Monitoring Health care System

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ABSTRACT

In the present scenario, there are very few techniques available to improve the health care system. As a result, even today, both hospitals and patients are suffering to monitor the patients' data efficiently. Due to this there is a huge possibility of ignorance and which may lead to causality of the patients. Huge and complex systems are made to solve such problems of hospital and they are costly too. Also there are problems like congestion in network due to large amount of data in short time period. The need for better technique is required to improve the monitoring the real time data of the patients on the hospital monitoring systems. Different techniques which are used have their own benefits and limitations.

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I. INTRODUCTION

In today's world, hospital management is one of the very important and critical systems to deal with. In most of the cases, it is very difficult to monitor patient in hospital, as there are lot of patients in different section of hospital. In this type of scenario it is difficult to monitor the condition of each patient and this may lead to casualty.

This problem is important to focus as after solving it, hospital management can monitor each patient's condition continuously. This will also store the history of patient's condition and can show it in pictorial format. This will reduce the mortality rate and will help hospital to take preventive action quickly. Also management will get the alarm indication of critical patient if some parameter of the patient goes wrong. In the current scenario, due to single and direct network point, there is more amount of traffic going on single server and is usually overloaded.

Till now, the problem is being solved by following ways:

1) Simple network communication between the patient and the doctor over the network.

2) RFID transmission is used as the communication medium in some of the cases, where the distance is very small.

3) Email is sent to the doctor, who is monitoring the specific patient.

4) An observer is required all the time to monitor the patient, this observer further inform the condition of patient to doctor by different medium.

II. CONCEPT BEHIND

The patients' data is collected through the sensors and is passed to the central server. The central server then stores the information in database for analysis and the readings of all the patients by segregating it. The data of critical patients are highlighted and shows that it is needed to be handled quickly. The data collection can be done very quickly and efficiently. Data can be analyzed also if required to improve the facility in hospital.

As there is no human intervention in collecting data, there is no chance of human error and delay. Data of patients will be received on real time basis and can be monitor to take the quick decisions. Further, this data can be processed and sent to doctor and other concern persons immediately whenever required. Though even the additional setup is required to create this infrastructure but it is worth the cost of human life.

III. VARIOUS TECHNIQUES OF HEALTH CARE MONITORING

One of the important techniques of any health care monitoring is using gateways and routers. Each technique explain below have their own merits and demerits. Few of them are described below:

A. A Distributed E-Healthcare System for Patient Monitoring and Diagnosis:

This paper presents a distributed e-healthcare system that is capable of automatically diagnose the condition of a patient based on data provided by the patient without intervention from a physician. This service is provided over the internet and can be used to monitor the condition of a patient. When the condition of a patient changes, the system will automatically inform the doctor. This was implemented by using Adaptive Neuro Fuzzy Inference System (ANFIS). This was also used to solve the benchmark problems of XOR and Parity Checker. This system may be useful for people who cannot regularly visit a physician or who are living in rural areas.

The result of this paper explains that the data available on the remote server is downloaded automatically and email is sent to the responsible person.

Thus the conclusion is made by designing and developing a mobile distributed eHealth system for patient monitoring and diagnosis on top of MAT LAB package. This system is capable of downloading the vital stats of patients from a server automatically and diagnose the condition of the patient and suggest remedial measures if the condition of the patient is not critical.

B. eWellness: Building a Smart Hospital by Leveraging RFID Networks:

The application of Radio Frequency Identification (RFID) sensor networks pervasively to the hospital environment has the potential to improve efficiencies in operational aspects through accurate capture of fine grained data. The sensor nodes generate large amounts of real or near real-time data. Understanding and managing these data in the context of the hospital pose challenges for the middleware which has to connect sensor networks with hospital applications. In this paper we propose an edge ware paradigm of organizing hospital RFID sensor data based on the notion of an event. The event is defined and its properties are discussed. A three layered event representation and reasoning model is developed to map raw sensory information to semantic events in the application domains. A prototype system, called eWellness is build for the test of the local hospital.

The result for the same is achieved by creating the application of RFID sensor networks within a hospital setting, particularly considering the ramifications of the data management and deployment on the backend enterprise system.

Thus the conclusion is made that RFID sensors are increasingly being deployed in the hospital environment to capture information in real time.

C. Real-Time ECG Transmission Via Internet for Nonclinical Applications

Telemedicine is producing a great impact in the monitoring of patients located in remote nonclinical environments such as homes, elder communities, gymnasiums, schools, remote military bases, ships, and the like. A number of applications, ranging from data collection, to chronic patient surveillance, and even to the control of therapeutic procedures, are being implemented in many parts of the world. As part of this growing trend, this paper discusses the problems in electrocardiogram (ECG) real-time data acquisition, transmission, and visualization over the Internet. ECG signals are transmitted in real time from a patient in a remote nonclinical environment to the specialist in a hospital or clinic using the current capabilities and availability of the Internet. A prototype system is composed of a portable data acquisition and preprocessing module connected to the computer in the remote site via its RS-232 port, a Java-based client-server platform, and software modules to handle communication

protocols between data acquisition module and the patient's personal computer, and to handle client-server communication. The purpose of the system is the provision of extended monitoring for patients under drug therapy after infarction, data collection in some particular

cases, remote consultation, and low-cost ECG monitoring for the elderly.

Thus the result is achieved by creating the client application which generates the GUI and gets updated values over internet. And a server is created to send the updated values to the client continuously.

The conclusion was made by the design of a complete real-time ECG acquisition, transmission, storage, and visualization system, which is easy to use and dedicated for nonclinical applications.

D. Heartcare an Internet based information and support system for patient home recovery after coronary artery bypass graft:

This is the type of practical research that many bedside nurses should be able to implement in the near future. Internet technology allows increased interactions with our patients by enabling them to access health care information. Rather than avoid this new technology, as so often is the first reaction in nursing, there needs to be a community of support to embrace and use it to expand our capabilities. In the face of ever increasing demands on the bedside nurse's time and shorter patient lengths of stay, the Internet is a helpful aid in

providing and reinforcing the postoperative information that individuals need. Plus, as the article states, the Internet has the advantage of allowing patients to access specific information on their own schedule. From patient surveys we gather that many feel they are rushed through their discharge information. Hence the result was achieved by making the application which sends the data of patients to doctors over internet after operation.

This conclusion is made that the patients data is sent over network on real-time and patients are monitored continuously after the operation.

Literature survey made as above is used for defining the work for present project. Hence the proposed worked is "ARM11 based Network Gateway for Critical Patient Monitoring System using LABView Simulation".

E. Temporal Analysis and Remote Monitoring of ECG Signal:

This paper "Temporal analysis and remote monitoring of ECG signal" is written to assist patients and doctors in health care. An arrhythmia is an abnormal heart rhythm. It can cause the heart rate to be too slow or too fast. Enough blood is not provided by the heart to the body when arrhythmias are severe or last long enough. This can cause patient to feel tired, lightheaded or may make him pass out. It can also cause death. Before treatment, it's important for the doctor to know where an arrhythmia starts in the heart and whether it's abnormal. An electrocardiogram (ECG) is often used to diagnose arrhythmias.

This paper is meant to acquire ECG signal from patient and analyze it to detect and classify its anomalies and abnormalities. This is achieved by extracting amplitudes and durations of parameters of ECG waveform such as P wave, QRS complex, RR interval and PR durations and then sending these signals to the remote machine where these signals can be monitored and analyzed. These parameters are compared with the normal values to determine the type of abnormality. Database of the patient is maintained for further use by the doctor. Under critical conditions, transmission scheme will ensure successful transmission of critical messages to doctors via Global system for mobile (GSM) network.

As the Network used for transmitting the signal is GSM network, which is not reliable and also not real time, this will lead to long delay in transmission of the messages. Due to such a long delay, patient may get into severe problem.

F. Exploring user acceptance of an e-hospital service: An empirical study in Taiwan:

The web-based appointment system (WAS) is considered one of the major Internet services provided by e-hospitals. Because of the very high adoption rate of WAS in the public medical centers in Taiwan, this research investigates the current status of its implementation and examines the factors affecting the user acceptance of WAS by integrating the Technology Acceptance Model (TAM) with the constructs of service quality. The study of the author proposes a research framework that delineates the user acceptance of WAS, which is verified via an empirical survey. This article is concluded with the managerial implications and suggestions. It gives the brief over view of how the system look likes and how it works.

But it does not discuss about its actual working and how it is implemented.

G. A Biometric Based Authentication and Encryption Framework for Sensor Health Data in Cloud:

This paper describes about the Assistive Maternity Care (AMC) a HA. This was designed so to assist care-staff in New South Wales (NSW), healthcare services, (such as doctors, nurses and midwives) and pregnant women to access the health records from beyond the physical location of a hospital zone, not only through desktop computers, but also through smart phones or PDAs. In the AMC application, a pregnant woman enters her blood pressure (BP) value regularly using a PDA or a desktop computer at home or at work, to allow her care-staff to monitor her condition. The AMC application was developed by establishing an Electronic Medical Record (EMR) system that contains EMRs of the patient to facilitate the clinical diagnosis. Furthermore, the AMC application is integrated with Short Messaging Service (SMS) gateway for sending an alert message. To monitor the BP without any manual data entry by the pregnant women, author extended this to a HMA by adding a Body Area Wireless Sensor Network (BAWSN). Therefore, in general, the HMA should be seen as two distinct parts, an HA (for example, the AMC application) and its monitoring component, the BAWSN. This is good for very fast and short distance communication. But in case of long distance communication, this system is not suitable. Also if there is large number of patients, then the system will not be able to handle such situations.

Researcher with paper name	Year	Merits	Demerits
"Exploring user acceptance of an e-hospital service: An empirical study in Taiwan"- Mong-Yuan Chang, Chuan Pang, J. Michael Tarn, Tai-Shun Liu f, David C. Yen [5]	2015	<ul style="list-style-type: none"> High end software make the system easy to manage both for hospital staff and patient. Automation helps hospital to maintain and keep the track of all the data easily. 	<ul style="list-style-type: none"> Infrastructure cost is increased and system becomes more costly. Error in software may lead to wrong interpretation.
"Temporal Analysis and Remote Monitoring of ECG Signal"- Amruta Mhatre [7]	2015	<ul style="list-style-type: none"> Data can be sent to long distance over the cellular network. Hassle free wireless connection can be achieved using GSM. 	<ul style="list-style-type: none"> Not possible for real time data and critical patients who need continuous monitoring. Unreliable network. Cannot be used for large group of patients.

<p>“ A Biometric Based Authentication and Encryption Framework for Sensor Health Data in Cloud”- Surender Sharma and Venki Balasubramanian [6]</p>	<p>2014</p>	<ul style="list-style-type: none"> • Patient’s data is accessible over internet through cloud. • Data once sent on cloud can be accessible on mobile phones, tablets etc. 	<ul style="list-style-type: none"> • Costly infrastructure is required to send data on internet. • Data security is on risk as data can be accessible to hackers. 	<p>recovery after coronary artery bypass graft”- Monika Trogdon [4]</p>	<p>hospital.</p>	<p></p>	<ul style="list-style-type: none"> • Infrastructure will cost both patient and hospital too.
<p>” A Distributed E-Healthcare System for Patient Monitoring and Diagnosis ” - Dr.R.Malmathanraj', M.Arun [1]</p>	<p>2012</p>	<ul style="list-style-type: none"> • High range of communication. • Large number of patients can be connected to single system. • Real Time data is received. 	<ul style="list-style-type: none"> • Complex network structure. • Costly Infrastructure. • Congestion problem in network • Intelligent users required. 	<p>“ Real-Time ECG Transmission Via Internet for Nonclinical Applications ”- Alfredo I. Hernández, Fernando Mora, Guillermo Villegas,Gian franco Passariello, and Guy Carrault [3]</p>	<p>2001</p>	<ul style="list-style-type: none"> • Real time data is transmitted to Hospital from remote locations. 	<ul style="list-style-type: none"> • Patient shall be available with the facility of internet continuously. • Handling large number of patients is difficult over such connection.
<p>“ eWellness: Building a Smart Hospital by Leveraging RFID Networks ” – B. Wu, Z. Liu, R. George, K. A. Shujaee [2]</p>	<p>2006</p>	<ul style="list-style-type: none"> • Cost efficient and small size implementation. • Easy to implement and easy infrastructure required. 	<ul style="list-style-type: none"> • Can only be used for short distance and no direct connectivity with internet. • Can be used for only limited number of patients. • Can carry only small amount of data. • Readings are not realtime. 				
<p>“ Heartcare an Internet based information and support system for patient home</p>	<p>2002</p>	<ul style="list-style-type: none"> • Continuous connectivity of hospital with patient even if not present in 	<ul style="list-style-type: none"> • Difficult for large group of patient to handle. 				

IV.CONCLUSION

In this paper, we have studied various techniques used in healthcare system to make it more efficient and better. Techniques like RFID [2] and GSM [5] good for short range communication in healthcare, but they have their own limitations like delay and short range. For high speed and hassle free communication in healthcare system, wifi communication using distributed network [1] is good. This gives the long range and wire free network to work with. Working with wireless network has its own challenges like network congestion. This is taken care at the algorithmic level and infrastructure level. For better performance and large number of patients wifi network is most suitable for the communication.

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