ISSN No. 0976-5697

Volume 7, No. 1, January-February 2016

International Journal of Advanced Research in Computer Science

RESEARCH PAPER

Available Online at www.ijarcs.info

A Survey of Cloud Based Healthcare Monitoring System for Hospital Management

A. Janaki & Dr. G. Shanmugasundaram
Department of Information Technology
Sir Manakula Vinayagar Engineering College Pondicherry, India

***Abstract*:** Cloud computing is an emerging new technology that can be integrated with healthcare monitoring system. The current survey of all healthcare organizations shows that it needs the assist of cloud computing to store the patients PHI and to get help in emergency condition using cloud based virtual server. For an effective monitoring system cloud uses BSN to monitor the patient health conditions. Here the cloud acts as a virtual server and stores the patient information in third party server which causes serious threats to security and privacy. The healthcare center contains various approaches which have been used to monitor the healthcare information based on cloud environment. The objective of this survey paper is to discuss about various techniques and taxonomy about the current methods of Cloud Computing used in hospital healthcare monitoring system. Moreover the strengths and weaknesses of the healthcare monitoring system approaches are discussed.

***Keywords*:** PHI-Personal Health Information, BSN-Body Sensor Network

I. INTRODUCTION

Mobile Healthcare system is an important application for pervasive computing in order to improve the healthcare monitoring system and save patient's life by using some wearable body sensor node and mobile cloud computing techniques to transmit remote healthcare monitoring to help people who are in need of an emergency conditions using some medical BSN (Body Sensor Network). Each patient's health details are manually stored and maintained by authorized person and they monitoring them. The Personal Health Records (PHRs) and electronic health monitoring (EHM) are the electronic versions of patient health information.

Today several healthcare organizations started to shift the patient health information to the cloud environment. Healthcare monitoring device is used for monitoring the patient's health conditions. Those health monitoring information can stored and communicate with the medical user or healthcare providers (doctor or nurse). In emergency situation health monitoring device will provide the service to client who registered in healthcare center using mobile cloud computing. In health care center each and every patient's have their own Personal Health Information (PHI) such as Heart Beat (HB), Blood Sugar Level (BSL), Blood Pressure (BP) and Body Temperature (BT) are collected by wearable sensor and those information are send to medical user such as doctor or nurse by using cloud computing technologies.

II. MOBILE COLOUD COMPUTING

It is the combination of two main abstraction are cloud computing and mobile computing and the other concepts such as wireless network these three are to bring the rich network operators , as well as cloud computing providers. Mobile computing: is a technology that allows transmission or transferring of data from one place to another place , transferring of data which means voice , video and document or file these are the collection of data or information. Cloud computing: Is a network of remote servers which is hosted on the internet to store, manage, and process data, it is a internet based computing, where by sharing the resource software and information are provided to the computer and it delivers hosted service's over the internet. Mobile cloud computing is just used to share or store the information from one place to another without using any wired media.

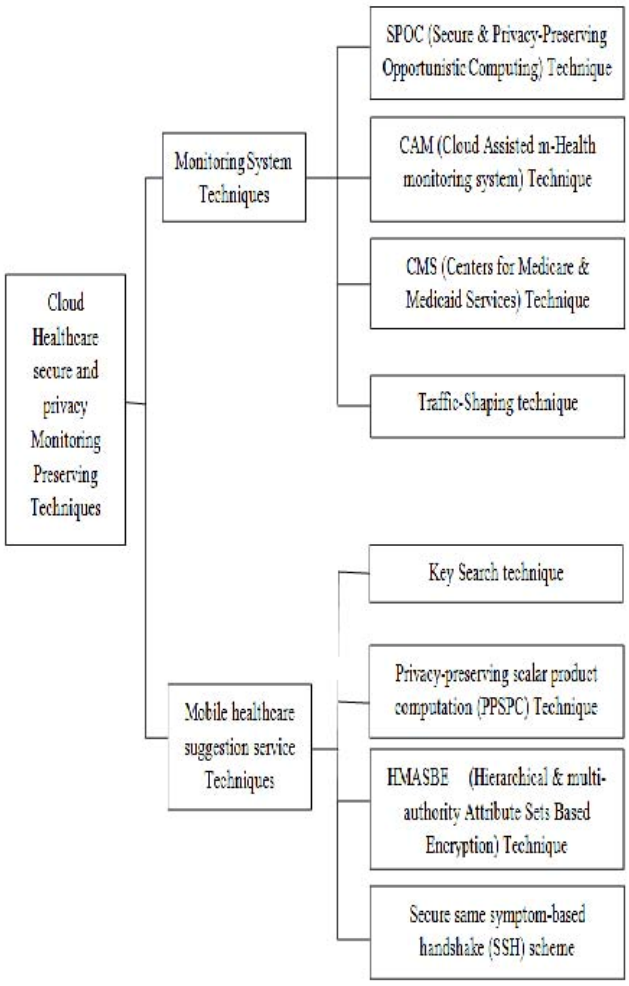

Figure: 1.Taxonomy of the cloud based healthcare monitoring system

III. DESCRIPTION

Secure and Privacy Healthcare Monitoring Preserving Techniques in the Cloud computing:

There are various techniques have been proposed to monitor the patient's health conditions. However, there is no clear classification of the healthcare monitoring and providing security techniques. Therefore, here we classify the healthcare monitoring system into two main taxonomy A) Monitoring System Techniques and B) Mobile healthcare suggestion service Techniques at the top level.

A. Monitoring System Techniques

The above technique is commonly used in the hospital healthcare cloud based system to monitor the patient's health condition with the help of wearable Body Sensor Network (BSN) and some sensor gateway. This technique is classified into several approaches, here we briefly define and present the approaches based on Monitoring System Techniques.

a. CMS (Centers for Medicare & Medicaid Services) Technique

Using cloud environment there is a mobile application for health care hospital management system to observe the patient's health state during emergency period gets an immediate first aid to be taken. For this medical motive the authors (Paramswari.R, et al) [7] introducing CMS technique which it otherwise known as Healthcare Financing Administration (HCFA). Using CMS technique to achieve a high class healthcare system and they aim for better care at lower costs. The patient registered all health details data to administrator, the authenticate sender will forward the health information to cloud storage after get an authorized token the patient details forward to administrator from the cloud storage. The development of this application will help to easy communicate between hospital administrations and the patients.

b. CAM (Cloud Assisted mHealth monitoring system) Technique

CAM technique is especially for, developing countries. When compared to the other techniques the monitor of the health status of patient's here is for every 5 minutes. Using Remote Mobile Health Monitoring System, cloud locate the position of patient's in emergency by transportable sensors in wireless body sensor networks to accumulate different physiological detail information, such as Blood Pressure (BP), Electrocardiogram (ECG), Body Temperature (BT). Here similarly the authors (Huang Lin, et al) [5] [9] use some encryption technique to introduced the CAM to secure the patients data, CAM otherwise called anonymization technique which contains issue of addressing security and privacy problem to cloud servers from resource constrained without compromising the privacy policy.

c. Traffic-Shaping technique

In cloud computing system the mobile health monitoring system with least service delay and privacy preservation by utilize geographically distributed clouds. Here the authors (Qinghua Shen, et al) [4] introducing the traffic-shaping algorithm to convert the health data traffic into the non-health data traffic through reduced traffic analysis (TA) attacks and to minimize the service delay. Another name of Traffic Shaping (i.e.) Packet Shaping is to manage and maintain the computer network traffic.

d. SPOC (Secure & Privacy-Preserving Opportunistic Computing) Technique

SPOC technique can monitor the high-intensive process and senses PHI by wireless Body Sensor Network (BSN) and store all the health information in cloud storage environment. SPOC is based on Attribute Based Access Control (ABAC). Authors here present a reference technique for hospital health monitoring system with some internal attackers. They used the miniaturized Wearable Body Sensor Nodes and hospital systems for monitoring the patient's health information (PHI) and the sensor used to sense the PHI such as Heart Beat, Body Temperature, Blood Pressure and Blood Sugar Level. By providing high-quality pervasive healthcare monitoring system for emergency medical condition, the authors (Ambika.S, et al) [2] use the cloud computing and wireless sensor network, to get the emergency help using sensor by monitoring patient's condition for each and every second.

B. Mobile healthcare suggestion service Techniques

This technique is used in the hospital healthcare center cloud based system to monitor and view the patient health using wearable Body Sensor Network (BSN) and update the suggestion by required doctor. This technique is classified into several approaches, here briefly define and present the approaches based on online health suggestion service techniques.

a. Secure same Symptom-based Handshake (SSH) scheme

Using mobile application to know who have the same diseases or same symptom to share their mutual experiences by communicate each other, when two patients meet, only if they have the same diseases or same symptom and they can use their private keys to make mutual authentication communication to share their own experiences. There exist many challenging security issues in MHSN (Mobile Healthcare Social Network) to overcome these issues the authors (Rongxing Lu, et al) [8] launch SSH technique for exchanging their private key securely to the authorized person.

b. HMASBE (Hierarchical & multi-authority Attribute Sets Based Encryption) technique

The patients will have full control of their medical details and they can efficiently share the health report to doctors, including other users, like healthcare providers, family members or friends. Here the authors (CHEN Danwei, et al) [6] initiate HMASBE technique to ensure flexible and scalable access control to PHR data in the cloud environment. The patients share their communication connection between Health Care Provider (HCP), Cloud Service Provider (CSP), Trusted Central Authority (TCA), Domain Authority (DA), Lower Level Attribute Authority (LLAA), after connection the patient exchange and collect their health information and stored in cloud electronic medical records.

c. Privacy-preserving scalar product computation (PPSPC) technique

The smart phone is an important part in mobile healthcare monitoring system. Similarly the authors (M.B.Sushrutha) [3] established a Privacy Preserving Scalar Product Computation technique (PPSPC) and applied this technique in smart phones to allow an authorized user to decide who

can join in the opportunistic computing whenever an authorized user is in an emergency condition. The smart phone accumulate and stores the data for every five minutes by the sensors and the collected information are encrypted using the session key, those encrypted data are transmitted to healthcare center using Wi-Fi with 3G transmissions.

d. Key Search technique

The health industry is the growing environment due to huge population and now a day's healthcare system combine with cloud computing to the key search technique will generate an alert shift the patient data into EMR (Electronic Medical message and send to certain doctor and medical Records) is being in use. Here the authors (Jubi Rana, professionals along with the location (address) of the et al) [1] introducing the key search algorithm for patient and those patients location address are sense tracking the patient's health and during crisis state through the GPS sensor system.

IV. COMPARATIVE STUDY

S. No	Author & Year	Challenges	Proposed Techniques	Advantage	Disadvantage
1.	Jubi Rana, et al., (Feb 2015)	-Lack of availability of expert doctors -Resources are not effectively allocated to devices	Key search technique	Emergency alert SMS send only to the authorized person	-No accurate measurements of environmental parameters -No efficient use of energy for remote site, mobile devices &vehicle based data
2.	Ambika.S, et al., (April 2015)	-Designed for improving patient monitoring -integrated with new sensor modalities -Monitoring patients health inside hospital	SPOC (Secure & Privacy Preserving Opportunistic Computing)	Monitoring patients health in each 5 minutes	-Just monitor while emergency no any indications and internal attacker
3.	M.B. Sushrutha (March 2014)	-information security & privacy preservation -Smartphone's energy insufficient when emergency take place -To know who are participate in the opportunistic computing and gives healthcare suggestions with secure and privacy	Privacy preserving scalar product computation (PPSPC)	Calculate the scalability problem	-Faces many problems in security and privacy preservation
4.	Qinghua Shan, et al., (March 2014)	-To load balance condition -aims to minimize the service delay	Traffic Shaping technique	-reduced communication costs -minimized service delay -detected by TA(traffic analysis) attackers	-Complicated case where users have random medical request & diverse privacy preservation requirements
5.	Huang Lin, et al.,	-reduce addressing	CAM (Cloud Assisted	The intellectual property of	-Problem in addressing security & privacy is the
	(June 2013)	security & privacy computational -Suggestions for healthcare center client	mHealth monitoring system)	mHealth service providers	computational to cloud servers
8.	Rongxing Lu, et al., (2010)	-primary security for patient's PHI secret	Secure same symptom based handshake (SSH) scheme	-Develop a SSH scheme for MHSH -Improve the processing of medical devices by connection them to cloud	-There is no patients 'selfish incentive mechanism for MHSN

V. CONCLUSION

We presented a survey of about Cloud Based Healthcare Monitoring System for Hospital Management. The privacy of the electronic health data in mobile cloud computing environment is a serious issue that requires special considerations. We presented a review on the technologies and approaches that are currently being used to deal with the important issue of healthcare monitoring system and mobile healthcare suggestion service. We have categorized the cloud healthcare secure and privacy monitoring preserving techniques into monitoring system techniques and mobile healthcare suggestion techniques. Moreover, we developed taxonomy of the techniques that have been applied to cloud healthcare monitoring privacy of the existing data. There are several challenges applied in cloud computing environment to the healthcare monitoring system and mobile healthcare suggestion service for hospital management.

However there are several techniques and approaches which overcome these challenges. We have reached the conclusion that of all the techniques are current trend in hospital cloud based healthcare monitoring system.

VI. REFERENCES

[1]. Jubi Rana , Abihijeet Bajpayee , "HealthCare Monitoring and Alerting System Using Cloud Computing , " Key Search Technique , Feb 2015 , "International Journal on Recent and innovation Trends in Computing and Communication , vol:3 , Issue:2.

[2]. Ambika.S , Hamsa Priyaa.M , Lalitha.R , Rajakuamari.K , "Secure and Privacy Approach in Mobile Healthcare , " SPOC(Secure & Privacy-Preserving Opportunistic Computing) , April 2015 , " IJIRST-International Journal for Innovative Research in Science & Technology , vol:1 , Issue:11.

[3]. M.B.Sushrutha , " Cloud-Assisted Privacy Preserving Mobile Health Monitoring Using PPSPC technique , March 2014 , " International Journal of Advanced Research in Computer and Communication Engineering , vol:3 , Issue:3.

[4]. Qinghua Shen , Xiaohui Liang , Xuemin (Sherman) , Xiaodong Lin , Henry Y.Luo , " Exploiting Geo-Distributed Clouds for a E-Health Monitoring System with Minimum Service Delay and Privacy Preservation , " Traffic-Shaping technique , March 2014 , " IEEE Journal of Biomedical and Health Informatics , vol:18.

[5]. Huang Lin , Jun Shao , Chi Zhang , Yuguang Fang , " CAM: Cloud-Assisted Privacy Preserving Mobile Health Monitoring , " CAM(Cloud Assisted mHealth monitoring system) , June 2013 , vol:8.

[6]. CHEN Danwei , CHEN Linling , FAN Xiaowei , HE Liwen , PAN Su , Hu Ruoxiang , " Securing Patient-Centric Personal Health Records Sharing System in Cloud Computing , " HMASBE (Hierarchical & multi-authority Attribute Sets Based Encryption) , China Communication-Supplement , 2013.

[7]. Ms.R.Parameswari , Dr.N.Prabakaran , " An Enhanced Mobile Healthcare Monitoring System in Mobile Cloud Computing , " CMS (Centers for Medicare & Medicaid Services) , December 2012 , " International Journal of Advanced Research in Computer and Communication Engineering , vol:1 , Issue:10.

[8]. Rongxing Lu , Xiaodong Lin , Xiahui Liang , Xuemin , " Secure Handshake with symptoms-matching: the essential to the success of mhealthcare social network , " Secure same symptom-based handshake (SSH) scheme, " Springer Science + Business Media, 2010.

[9]. Amit Kumar , Siba Prasad Ojha , Anuradha.C , " CAM:Cloud Assisted Privacy Preserving Mobile Health Monitoring , " CAM technique , International Journal For Technological Research In Engineering , April 2015 , vol:2, Issue:8.