Indian Journal of Science and Technology, *Vol 9(16), DOI: 10.17485/ijst/2016/v9i16/92237, April 2016*
ISSN (Print) : 0974-6846
ISSN (Online) : 0974-5645

Enabling Human Health Care Monitoring using Ubiquitous Computing

K. Karthick*, T. Praveen and M. Queen Mary Vidya

Vel Tech High Tech Dr. Rangarajan Dr. Sakunthala Engineering College, Avadi, Chennai - 600062, Tamil Nadu, India;
karthivel.me@gmail.com, praveent738@gmail.com, queenmaryvidya@gmail.com

Abstract

Background/Objectives: Technology is moving from delicate computers to handheld, intellectual and everyday devices with embedded technology and connectivity. **Methods/Statistical Analysis**: Persistent computing is an innovative aspect of delicate computing that integrate portable communique, user electronics and the power of internet and persistent computing, envisage a future in which computation becomes part of the situation. **Findings:** The objective of the idea is to enable the health of human care with this concept of ubiquitous computing. The Wireless Patient Sensor Networks (WSPN) is used to find the blood pressure level of humans. **Application/Improvements:** The application is implemented using DMS architecture which improves the usage of ubiquitous computing in medical applications.

Keywords: DMS Architecture, Electrocardiogram, Wireless Patient Sensor Networks

1. Introduction

The objective of persistent computing, which combines present network technology with wireless technologies, voice detection, internet potential and synthetic astuteness, is to generate an atmosphere where the connectivity of campaign is entrenched in such a method that the connectivity is an obstructive and it is an abundant, causally available, often invisible devices. It makes a computer so natural that uses it without even thinking about it. It provides admittance to appropriate information and applications through a new class of ubiquitous, intellectual appliances that have the capability to simply congregation when and where needed. Projecting this trend into the future, envision an explosion of interconnected small devices from watches to cars that make lives easier and more productive. An equivalent revolt deception in the network-enabling these persistent computing devices by providing transparent, ubiquitous admittance to e-business services shown in Figure 1. In general, it is roughly the opposite of virtual reality[1].

Any time/anywhere---> any tool any network--->any data.
Any time: 7 days X 24 hours, global, ubiquitous access
Any device: pc, PDA, cell phone and so onward.
Any network: Access notification, data synchronization, queued transactions, wireless security, content variation, advance tools, machine and client administration.
Any data: e-mail, private information administrator, inter-intranet, open services.

2. Problem Definition

The Existing system of health care monitoring has only the limited functions which monitor the Health of the patients within the limited areas. Due to this limited health care monitoring the patients health care cannot monitored outside the home. To overcome this limited monitoring a new wireless health care monitoring has been introduced called Mobile DMS Client.

The Experimental setup of the DMS architecture is demonstrated in Figure 2. The setup consists of hospital

**Author for correspondence*

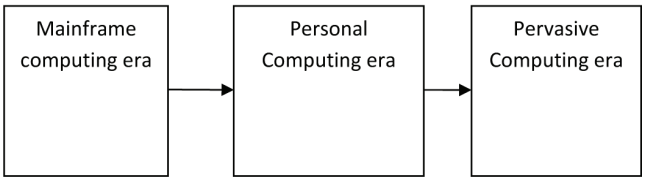

Figure 1. The basic function of Pervasive Computing.

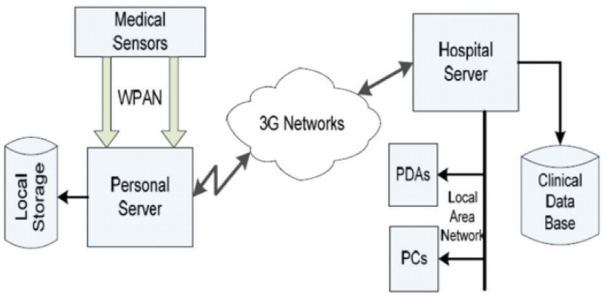

Figure 2. The architecture of DMS.

server, patient server and medical sensors which are connected by Wireless Personal Area Networks. The hospital server which holds patients health information like patients blood pressure level, body hotness and pulse rate which is monitored by Electro Cardiogram (ECG). The collected information are transmitted through wireless networks life Wi-Fi and Bluetooth and stored in local databases. The information is continually collected by the hospital server through ECG and keep the patients health in improve mental way to have effective health monitoring systems[2].

3. Experimental Setup

The experimental working view of ECG System is represented in Figure 3. The ECG system consists of BT pulse oximeter, BT arduion compass module, BT blood pressure parameters. These parameters are used to retrieve information's about patient's blood pressure level, pulse rate and body hotness through ECG and transmitted by Android smart phone. In Existing approach patients information is monitored only in hospital. To overcome this limitation a Tyndall DMS note is introduced. Tyndall is associated with Mobile DMS client. This mobile DMS client which monitors patient's health conditions every 30 min and these data sets and transmitted to hospital data bases and separate database server is maintained for every individual testimony[3]. A local area network is maintained to transfer the patient's details.

Figure 3. The experimental model view of ECG System.

3.1 DMS Architecture

Health care monitoring is effectively demonstrated using ubiquitous computing. The DMS architecture works with the function of ubiquitous. Tyndall is comprised of processor and sensors. The sensors are used to sense blood pressure, pulse rate and the temperature of the body.

Tyndall DMS client is used to cover large geographic areas which sense the conditions of patients not only inside the hospital even the Tyndall covers all equivalent places[4].

Tyndall experiment setup consists of the following terminologies

- Mobile DMS Client

3.1.1 Mobile DMS Client

The Mobile DMS Client is used to monitor the patient's health at regular intervals and the collected information is send to DMS hospital server databases. Mobile DMS client senses the patient's conditions at two places

- Monitoring inside home
- Monitoring outside home

3.1.1.1 Monitoring inside home

Tyndall-DMS-Note (patient sensor) monitors the patient's details at inside the home and sends details to DMS-Client (Home Computer). Here raw antenna is used to collect information are sending unswervingly to DMS client for analysis. The collected information is send to the DMS

client and continually monitors the patient's behavior. If any abnormal symptoms shown above the normal range the doctor is altered. The collected data are transferred through wireless networks[5].

3.1.1.2 Monitoring outside the home

The previous existing system senses the behavior of patient's only within a limited range. If particular patients move the limited area access the conditions of patients cannot be monitored. To overcome this Tyndall DMS mobile client is used to senses the actions of patients whether it's normal or abnormal conditions. The collected information is transmit to the hospital server through the DMS client and if any abnormal variation is exhibit corrective alert actions is given to the particular individuals[6].

3.2 DMS Mobile Client

DMS mobile client senses the following various levels of the human being. To calculate the normal level of the patients'. The following conditions are

- Blood pressure
- Heart beat rate
- Glucose level
- Body weight
- Auscultation
- Tablet dispensing
- Injection registration
- Peak flow

DMS client consist of sensors, Operating System (tiny Os), Tyndall DMS, DMS client and server. So, if any abnormal variation is exhibited immediately the particular individual is altered through SMS system. The SMS is send to the hospital DMS server.

3.3 Monitoring and Interacting with the Blood Pressure Sensor

Tyndall DMS is used to calculate the DMS client's blood pressure of a patient is calculated by following analysis:

3.3.1 Periodically

A patient's profile which periodically gets varied according the real time situation. A normal human being's blood pressure can be varied in two simulations (high and low). Tyndall normally senses blood pressure readings every 20, 80 and 120 minutes to detect any variation in pressure ratings[7].

Figure 4. Human Parameters in Health Care.

3.3.2 Contextually

A patient's medical condition can be varied depends upon the condition of human being.

For example consider a patient's condition during pregnancy period. The patient may have high blood pressure at this time. These conditions are not abnormal conditions and should not give false alarm to the individual. The Tyndall is constructed according to that, these exceptional conditions are not transmitted to the DMS client.

3.4 DMS Blood Pressure Classification

Human beings have normal blood pressure ratings as 80 mmHg (diastolic) and 120 mmHg (systolic). Sometimes this high blood pressure level cannot be monitored which lead to dramatic change in patient's behavior to avoid this situation Tyndall DMS client senses these abnormal changes and send alarm signal to Mobile DMS client to alert this situation[8].

Through this development the semantic regions of the blood pressure level is collected and send to the hospitals database to find the conditions of patient's[9].

It compare the patient's recent blood stress level beside the patient's summary (i.e. NORMAL expected range). If a normal categorization is not found the next level above

and below normal are examine (i.e. hypertension and hypotension)[10].

4. Future Enhancements

In this approach the Tyndall and Mobile DMS client and server are used to collect the patient's information about the health in all environment i.e. inside the hospital, inside the home and outside the home and every where the condition of patient's is effectively monitored to give effective health care monitoring using Tyndall DMS client.

In future, additional research into pulse rate and ECG ontology's and how they interrelate with the DMS structural design is required. DMS protocols need to be developed to advance on data consist and the effectiveness of the system will be improved. The application is implemented using DMS architecture which improves the usage of ubiquitous computing in medical applications[11].

5. Conclusion

Persistent computing is quite a bit different, because it assumes a distributed environment model. It has the impending to significantly amend how people use devices to unite and commune in daily life. This paper described the implementation of pervasive computing in medicine – as a life saving tool. Thus, this study stands at the beginning of yet another era in computers – pervasive era.

6. References

1. Siegemund F, Floerkemeier C. Improving the effectiveness of medical treatment with pervasive computing technologies. Workshop on Ubiquitous; 2003. p. 1-5.
2. Parati G, Bilo G, Mancia G. Blood pressure measurement in research and in clinical practice: Recent evidence. Curr Op Nephrol Hypertens. 2004; 13:343-57.
3. Pickering T. The measurement of blood pressure in developing countries. Blood Pressure Monitoring. 2005; 10(1):11-12.
4. Life PH. World Health Organization. The World health report: Reducing risks, promoting healthy life. Geneva: WHO; 2002.
5. Collins R, Peto R, MacMahon S, Hebert P, Fiebach NH, Eberlein K. A blood pressure. Part 2: Short-term reductions in blood pressure Lancet. 1990; 335(8693):827-38.
6. O'Brien E, Asmar R, Beilin L, Imai Y, Mallion JM, Mancia G. On behalf of the European society of hypertension working group on blood pressure monitoring. European Society of Hypertension recommendations for conventional, ambulatory and home blood pressure measurement. Journal of Hypertension. 2003; 21(5):821-48.
7. Cramer JA, Mattson RH, Prevey ML, Scheyer RD, Ouellette VL. How often is medication taken as prescribed? JAMA. 1989; 261(22):3273-7.
8. Urquhart J. The electronic medication event monitor - lessons for pharmacotherapy. Clinical Pharmacokinetics. 1997; 32(5):345-56.
9. Weiser M. The computer of the 21st century. Scientific American. 1991:94-100.
10. Varshney U. Pervasive healthcare and wireless health monitoring. Journal Mobile Networks and Applications. 2007; 12(2-3):113-27.
11. Prince BP, Krishnamoorthy K, Anandaraj R, Jeno Lovesum SP. RSA-DABE: A novel approach for secure health data sharing in ubiquitous computing environment. Indian Journal of Science and Technology. 2015 Aug; 8(17):1-9.