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A Survey of E-Healthcare Information System based on Android Application

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Abstract: ***The unintended medical errors are a big threat to patient safety. Therefore, there is a challenge of delivering safe healthcare is important now days. An attempt to meet these demands, healthcare systems have increasingly focusing at deploying information knowledge to scale resources, to decrease queues, to minimize or avoid the errors, and to give modern facilities in remote communities. The computer-aided tools are not vital for interpreting patient specific data in order to determine the most suitable therapy from the diagnosis. In order to make sound decision making on treatment and diagnosis for individual perspective, all the relevant health information of the patient needs to be available and transparently accessible to them regardless of the location. Mobile application is helpful to the doctor and patient or doctor communicate with each other very quickly, the distance between them does not matter or too long. For the optimization of medical data, better quality and accuracy in the decision making as well as shared access to the database a new technology Android Application deployed. The apps in E-Healthcare Information System remotely monitor biomedical signals from the patient. The recorded biomedical signals of the patient transmit to doctors or patients from a server to mobile application. The most significant issues in E-healthcare information systems is to optimize the medical data quality extracted from distributed and heterogeneous environments, which can improve diagnostic and treatment decision making. This paper provides a novel comparison of the state of the art solutions available in the E-healthcare information system and it also proposes a multi-agent web service structure which is based on service oriented architecture for the optimization of medical data.***

Keywords: Android Mobile Device, Personal Area Network, Machine-to-Machine, Wearable Sensor

1. Introduction

In recent times the mobile application, which become great interest to research initially offered for the information retrieval such as email, calendar, contacts, and stock market and weather information. Now a day's there is a demand for medical application. In previous, the information concerning an individual patient is a composite, and it gets generated from a variety of sources. This information maintained by many different applications and it is creating in various media formats. In traditional, the decision analysis made good outcomes even though there is an uncertainty surrounding the decision. So, sensitivity analysis with the help of decision analysis is the use of the best methodology for expert opinion.

In latest technology, the human body is connected to wearable sensors that gather various health parameters such as Heart Rate Variability (HRV) or electrocardiogram (ECG). Wearable sensors capture the information in Machine to Machine (M2M) gateway. The obtained information is sent over to server PC using internet and then to the mobile application through the internet. The packet transfer using user datagram protocol (UDP) to server and plots biomedical signals on mobile device [1]. The UDP protocol is a simple OSI transport layer protocol for client/server network applications based on Internet Protocol (IP).

The wireless machine to machine (M2M) healthcare solution use Android mobile devices successfully implemented in a global network [1]. The Service-Oriented Architecture (SOA) is a combination of Techniques and methods for scheming and developing software in the form of interoperable services. The Multi-Agent Systems (MAS) composed of several interacting intelligent agents within the environment. It can be used to solve the problems that impossible for an individual agent.

This paper organized as follows: Section 2 presents the Existing System Architecture, Section 3 describe Literature Survey. Section 4 illustrate Proposed System Architecture, Section 5 draws the conclusion and future scope.

2. Existing System Architecture

Figure 1 shows the sensors complicated devices that are in general used to sense and react to electrical or optical signals. A Sensor converts the bodily parameter (for example temperature, blood pressure etc.) into a signal that measured electrically. The sensors can be classified based on power requirement such as an active sensor that require supply and passive sensor which do not require power supply. The wearable sensor based on Tiny Operating System (OS) that is a component-based operating system. The Tiny OS is an embedded operating system written in the nesC programming language. Its applications had written in nesC that is a dialect of the C language. The M2M gateways link one or more locally networked devices to a wired or wireless broadband connection. The M2M gateway is more secure as well as more energy efficient that is offer secure link between doctor and patient the private information does not get stolen.

The mobile device based on Android operating system (OS) that based on the Linux kernel and now developed by Google. Android designed for touch screen mobile devices like smart phone. Android provides the ability to run

applications. The users are downloading and installing the APK file, or downloading using application store program that allow the user to install, update, and remove applications for smart phones. The hardware platform of Android is the 32-bit Advance RISC Machine Version (ARMv7) architecture. The biomedical signals mean graphical representation of waves.

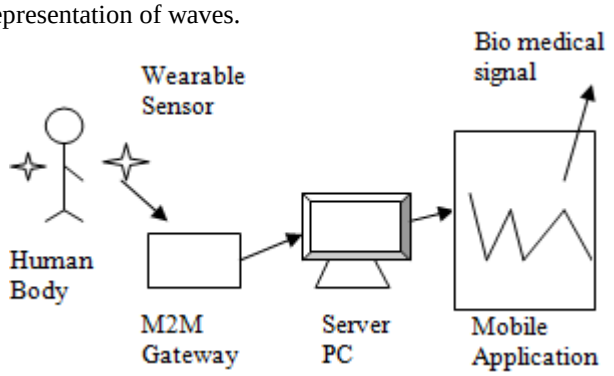

Figure 1: System Architecture for E-healthcare Information System

3. Literature Survey

The physiological parameters of a patient collect by wearable sensors stored in M2M gateway and transfer over the network. The Microsoft Access database used to store the data that contains a Table in which the different settings for the sensors are store. During the transmission for avoid corruption of data, communications protocol used. In order to get the right value of the sensor sent, data is divided by 100 [5].

M2M Gateway [9], demands mobile applications that provide more security. The M2M communication means one machine communicates with another one without interfering the human beings and transfer data through network. M2M services implemented three entities like M2M service platform, M2M gateway, and M2M terminals.

EMI issue [12], in hospital environments Electromagnetic Interference (EMI) issues, arises which are also called Radio Frequency Interference (RFI). The RFI can disrupt almost any electrical or electronically controlled device. It causes lack of data to a total loss of data. The Automatic Repeat Request (ARQ) protocol is used to recover from the erroneous transmission. Due to Discrete-Time Markov Chain Model data packet transmits successfully.

Tele-cardiology means real-time transmission of Electro Cardio Graphic (ECG) signals over a wireless network. But due to the high collision rate of data packet required frequent retransmissions that cause unpredictable delays and jitters in a wireless network. It degrades the quality of real-time ECG services. So, to prevent collision enhanced Quality of Service (QoS) aware MAC coordination introduced [8].

EDPF [13], the monitored bio-signals data from the patients are transferred through a radio access network and core network by the network service provider to the e-Health service provider. The Earliest Delivery Path First (EDPF) scheduling is used to choose packets to be transmitted over the network so that the delay requirements can be satisfied. It will reduce the delay for treatment of critical patient.

The Distributed Coordination Function (DCF) extends its Contention window (CW) volume to obtain the congestion level on the channel when it loses packet due to collision. The new modification to DCF (N-DCF) and Fast Collision Resolution (FCR) algorithm has improved the throughput performance [14].

IPv6 [3], this technique can be used for the data transmission over the network without packet losses and to extend the range of healthcare services. In order to prevent packet losses in data transmission, some existing protocols of the 6LoWPAN like hierarchical routing used.

The Dynamic Host Configuration Protocol (DHCP) is stateful. It used for distributed network configuration parameter such as IP address for interface and services [7].

To accomplish the cardiologists' opinions of the ECG monitoring quality, Simple Mean Opinion Score (MOS) test developed [11]. The Bluetooth gateway device that contains two radios (Bluetooth + IEEE 802.15.4) can bridge Bluetooth network an IEEE 802.15.4 network. The device formed is called "Personal-Area Network Hub" (PAN-HUB) [10].

Table 1: Protocol Comparison

Sr. No.	*Protocol*	*Layer*	*Packet error detection and correction*	*Packet loss rate*	*Routing delay*
1	Communications [5]	Application	High	Low	Low
2	User Datagram Protocol (UDP) [1]	Transport	Low	Low	Low
3	Ad-hoc on demand Distance Vector (AODV) [3]	Physical	Low	Low	Low

Table 2: Algorithm Comparison

Sr. No.	Algorithm	Throughput improves	Delay	Advantage	Disadvantage
1	Earliest Delivery Path First (EDPF) scheduling [13]	Low	Low	Schedule packets delivered at the primary to the host.	The packet not scheduled it dropped without transmission.
2	Carrier Sense Multiple Access (CSMA) [10]	High	Low	Easy to implement.	CSMA could not recover packet from the collision.
3	Carrier Sense Multiple Access / Collision Avoidance (CSMA)/CA [10]	High	Low	RTS/CTS provide virtual carrier sense.	Not efficient as CSMA/CD
4	Fast Collision Resolution (FCR) [14]	High	Low	It achieves high throughput performance.	The number of stations affects the Performance of the FCR algorithm.

Table 3: Technique Comparison

Sr. No.	Technique	Mobility	Flexibility	Packet loss	Collision
1	Internet Protocol version IPv 6 [1]	Yes	Yes	Low	Low
2	Internet Protocol version IPv 4 [1]	No	No	High	High

4. Proposed System Architecture

Figure 2 shows that the user makes a request to the service agent then service provider verifies that users authenticate or not. If the user authentic then required service provide to that user. The Service-Oriented Architecture (SOA) will be used to cope with the distributed environment for E-healthcare Information Systems. The goal of SOA is to offer enhance healthcare systems to users. A web service technology widely accepted as one traditional implementation of SOA. The companies, organization, or individual developers can distribute functional entities that catalog and publish their service components to a Universal Description, Discovery, and Integration (UDDI) for public use. Web services are like as a single transaction, example the querying of a medical record, or more complex multiservice. The study starts with creating static and dynamic models for medical data quality in terms of data withdraw so that the objects and processes defined. The plan of healthcare Intelligent Agents (IAs) follows the classification of the medical data quality models. The aim of the IA enables to offer external communication for mutual service, internal inference shells for monitoring and tracking of the data extraction process, and a printing report service.

In Evolutionary computing optimizing data selection the data is extract by general practice that is agent. After that data is migrate. In data processing include cleaning, updating. A multi-agent framework will be monitor, discover any data inconsistency between original and actual medical records. The finally data analysis is done by collaborator and load clinician. The proposed algorithm can be able to function accurately and efficiently on multi domains with multi objectives Quality of Service (QoS) attributes. The quality of data analysis in terms of its accuracy, integrity, consistency, completeness and uniqueness verify.
The client can then use Simple Object Access protocol (SOAP) to actually call one of the operations listed in the WSDL using XML or HTTP. It is used to describe the client/server interface that should between web service clients and servers.

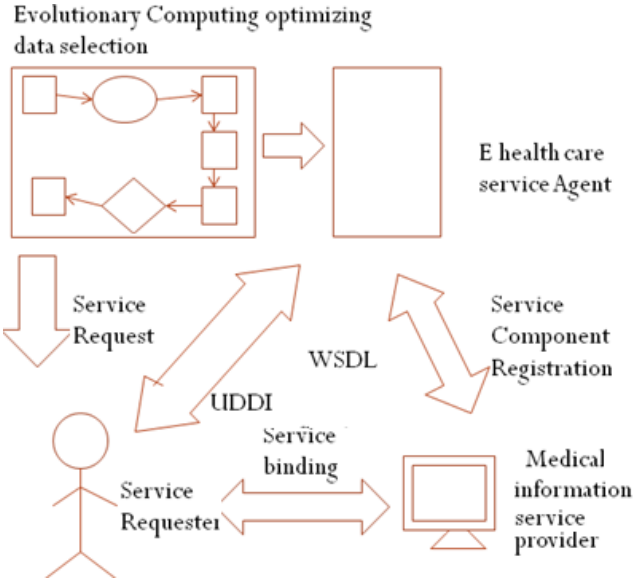

Figure 2: Proposed System Architecture

5. Comparison of Existing and Proposed System

The issue is data selection and quality optimization in distributed environment of E-healthcare Information System. Computer-aided tools are not compulsory for understand patient-specific data in order to conclude the most suitable therapy from the diagnosis. To be work out over the problem of data selection and quality optimization by using Evolution Computing Algorithm into SOA of web service will be use.

The proposed system will be practically deployed and integrated with E-healthcare information systems for local hospitals. The experimental results will be show that the proposed EA was able to optimize the medical data workflow on a medical experimental data. It reduces the medical error. It can receive data in real time. The better quality and accuracy in the decision making, shared access to database. The time is less consumable by proposed system. The miscommunication can be reduced and provide user with the best service. The patient life can be more secure. The enhancing security and privacy of patient information will be providing.

The cost is reducing through decreased paperwork. It reduces duplication of test and improves the health of patient. The physician has immediate access to patient information. The patient can save time not by having to revisit to clinic to pick up the test result and through the scheduling appointments. The care plan can be change as assessment results gather. There is no need to manually information enter into system because this step is eliminate.

6. Conclusion and Future Scope

The existing system which highly dependent on the server, must have network connection and hard for non-expert users. While the data transfer over network cause loss of quality of data in term of accuracy, integrity which raise problem of data selection and quality optimization in a distributed e-Healthcare environment. The future work is to resolve the

problem of data selection and quality optimization in a distributed environment. For this purpose focused on medical data extraction for the SOA-based healthcare systems.

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