

# Proposing telemedicine system by using Wearing computer

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**Abstract**— Telemedicine is new method for better diagnosis and treatment. Telemedicine means remote and 'Medicine' comes back to Latin word 'mederi' means 'cure') the use of telecommunication and information technologies in order to provide clinical health care at a distance, came into medical dictionary in 1920. Even if the term telemedicine has a more recent origin, but the concept is a relatively old one. It comes back to 90 years ago when Einthoven in 1906 published his work with distant consultation on electrocardiography.

The aim of research, telemedicine system has been presented by emphasizing on wearable device. So, the research method is "descriptive\_ analytical". Thus this research in two parts has been organized. At first, proposed solutions of telemedicine system has been considered.

Then based on theoretical framework, telemedicine system has been proposed according to wearable device. According to proposed system, it is possible telemedicine was a profitable alternative in Iran remote, rural/urban places.

## **Key word**

*Telemedicine, advantage, wearable device, Iran*

## **1. INTRODUCTION**

Clinical telemedicine enables the provision of specialist medical consultations to patients living in distant places and their primary care providers [1]. Furthermore, telemedicine reduces travel, saves time and addresses the challenges faced by patients with diseases that require regular follow-up and monitoring such as hypertension and diabetes [2, 3]. Additional advantages of telemedicine include the reduction of medical errors by doctors and nurses, increased quality of education and training for doctors and medical personnel, increased capabilities for faster growth of medical knowledge and clinical care for diagnosis and treatment and the increased use of executive services and home .While telemeters can dramatically improve upon traditional methods of medical treatment, several physicians and healthcare providers continue using traditional systems such as telephone and/or pen and paper procedures [4]. Telemedicine has been used sparingly due to past habits, laws, issues with insurance reimbursement and problems with support organizations [3, 4]. Most studies have only reviewed one aspect of the utilization of telemedicine such as rules or costs. In contrast, we examined all aspects of the application of telemedicine and we evaluated its efficacy.

## **2. Method & Material**

This research is applied. The research method is analytical. The aim is proposing telemedicine system based on proposed theories in recent 15 years. So, in this paper, scientific papers and theories has been reviewed. In order to proposing system PUBMED + SIENCE DIRECT papers was considered. At first telemedicine system has been presented in Iran.

## **3. General applications of telemedicine**

The patient via the internet and communicate with accompany offering this service all the way to carry your medical services. Telemedicine is the use of multimedia tools and using a large number of modern technologies (such as live video, live audio, data and medical images, communications systems, text, photos and vital parameters), an independent time and place of medical service secretes.

### **3.1. History of Telemedicine**

In 1996, the Department of Defense, United States of America, a medical network in Bosnia that doctors in the medical arena five Army Medical Center in the United States of America (Washington, Texas, California, Columbia and Hawaii) was

associated. The telemedicine project, the communications satellites used by the military physicians to the actual picture and sound, consult with each other. In 1920 the resident physician at the beach with the ship's radio messages. In 1968, the United States of America of video communication between the hospital and the airport was used to evaluate patients at the airport [15].

In the 1970s through the satellite network health services to remote areas of Alaska and Canada were allowed. Doctors at the forefront, using existing technology, motion pictures and video were taken away to the hospital for diagnostic support. Doctors also the same system for accessing records and computerized medical records and follow-up the patient was discharged. Their results, radiology, laboratory and prescription drugs received and digitized medical services, dental remote clinical information online, mail, procedural and control technologies and services used. The advent of electronic medical and hospital, as one of the most essential components of human societies has led to many changes in the virtual world. Virtual Hospital, using virtual memory and advanced communications networks to treat and cure patients and provide services beneficial to all users.

### 3.2. Goals telemedicine

The main goal of telemedicine consultation, transmission of information by electronic signals, electronic computerizes clinical services and medical facilities:

- Improved patient care
- Improve access to health care for rural and underserved areas
- Better access to doctors for advice
- The availability of resources for practitioners to conduct automated tests
- Reduce the cost of medical care, patient transport and accommodation in Hospital
- Medical care services (in the geographical area and the population at large)
- Reducing the transfer of patients to health centers
- Managed care in hospitals and health centers in space.

### 3.3. Benefits of using telemedicine

The overall benefits of telemedicine are:

1. Reduce the time and cost of living and learning spaces
2. The use of the experiences of doctors and specialists in other parts of the world and take advantage of their expertise.
3. Quick access to physicians for consultation.
4. The remote operation
5. Using robotic surgery, which reduces surgery time, quick and precise cutting, eliminating shake surgeon fatigue, greater accuracy and less error in operation, resulting in faster patient recovery.

### 3.4. Check the status of telemedicine in Iran

As in the private sector in the health system has been formed the public health system is that it has the existing health system is practically not possible to enter into costly projects.

Country requires the formation of a private medical group that accounts Using economic models to provide medical services to the target population using information technology.

In this regard, in recent years attempts have been made to clarify various aspects of the Society. However, progress has fallen in parts of the country and saw what happened in this area, but this happened so that we cannot make changes in the medical field; this project has been in the country since the conditions. Tools telemedicine development in the country and looks Thinking that most of the infrastructure and public understanding of the issue. The Ministry of Health and Medical Education and Telemedicine methods tend to move in this area has And the government also intends to increase the share of people in the country We hope this can be a serious approach to private institutions in this field takes shape.

Telemedicine means of telemedicine in our country has considerable experience with the development of information technology, development in this area will be provided. Now in the imaging, diagnosis and remote areas of developing comprehensive discussion of our images and remote consultation, using e-mail is used in medical diagnosis. Infrastructure necessary for the development of virtual space in hospitals, including aspects of culture and know-how. Since the establishment of electronic hospital requires participation in various specialized fields of engineering, to medical groups and allied groups. Therefore, these groups should be provided the opportunity to engage the culture. E-hospital hospital services based on the new conditions for the promotion and development of education and research at university hospitals provide.

### 4. Wearable computer

Wearable computing facilitates a new form of human-computer interaction comprising a small body-worn computer (e.g. user-programmable device) that is always on and always ready and accessible. In this regard, the new computational framework differs from that of hand held devices, laptop computers and personal digital assistants (PDAs). The "always ready" capability leads to a new form of synergy between human and computer, characterized by long-term adaptation through constancy of user-interface.

A wearable computer is a digital device that is either strapped to or carried on a user's body. It is used most often in research that focuses on behavioral modeling, health monitoring systems, IT and media development, where the person wearing the computer actually moves or is otherwise engaged with his or her surroundings.

Wearable computers provide constant computer and user interaction. In extreme cases, they serve much like a prosthetic, in that device use does not require users to cease other activities.

Wearable computers bring to fruition many opportunities to continuously monitor human body with sensors placed on body. They provide new avenues to continuously monitor individuals, whether it is intended to detect an early onset of a disease or to assess the effectiveness of the treatment. In the past few years, the community has observed a large number of applications that have been developed using wearable computers. There are two features:

Shelf life: continuously available and when the user is busy doing other things at the same time runs out.

Adaptability: the structured interface and the same functionality can be used in any situation.

## 1. Discussion

### 5.1. Proposed solutions of telemedicine

#### Wireless

Wireless telemedicine is a new and evolving area in telemedicine and telecare systems. Healthcare personnel require real time access to accurate patient data, including clinical histories, treatments, medication, tests, laboratory results and insurance information. With large-scale wireless networks and mobile computing solutions, such as cellular 3G, Wi-Fi mesh and Wi MAX, healthcare personal can tap into vital information anywhere and at any time within the healthcare networks. The recent introduction of pervasive computing, consisting of radio frequency identification (RFID), Bluetooth, ZigBee, and wireless sensor networks, further extends the potential for exploitation of wireless telecommunications and its integration into new mobile healthcare delivery systems [5].

Lusignan in 2000 telemedicine system has been proposed [6]. Also, Capomolla wireless system has been presented in 2004 [7].

#### Mobile

A mobile telemedicine system provides a platform for data acquisition from numerous instruments and its harmonious transmission and delivery to healthcare providers through based wireless networks. Because this system can be used in any geographical area in which networks provide coverage, it offers significant hope in reducing mortality and morbidity as well as presenting monetary savings [8].

Raju group proposed their study about using mobile in telemedicine 1t 2004. Takayam and Beer Mobile system remote control (MRT). (FIG 1) [9]

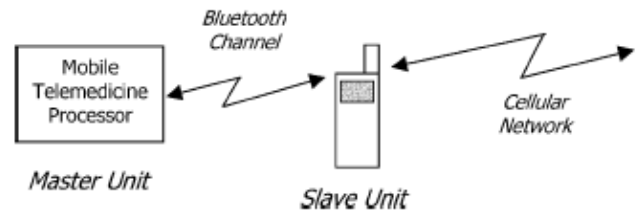


Fig 1: Mobile Telemedicine

#### Body Language

Body LAN In order to transfer data a series of medical physiological sensors distributed over the body is obtained. Body LAN could be used in boletus, RF-ID and Communication techniques "Zigbee". Body LAN characteristics are [10]:

Parameter	Value
Volume	129 mm×100 mm×20 mm
Weight	166 g
Biomedical signals	ECG, the respiratory rate, pulse, oxygen concentration, body temperature, blood pressure
ECG biomedical signal	±12 mv
Bandwidth	0.5 Hz-100 Hz
Sample rates	256 samples/sec
Flash memory	32 Mbytes (4×64 Mbits)
ADC	12 bits
Processor / Processor speed	PIC16LF877/7.3728 MHz
Communication link	Bluetooth
Communication range	10 m
Interference	RS-232
Display	LCD
Battery	2×AAA

Fig 2: Body LAN Characteristic

### 5.2. Proposed system of telemedicine

#### Mobihealth system

In 2007 a system was introduced where continuous long-term monitoring of the vital signs of patients had cardiovascular risk. This system is real time. Also, Online detection, alarm bells, automatic wireless link is safe and effective navigation. Indeed, wearable system and real time system are combined [11]. The Characters of system are:

1. Having a highly integrated, wearable system for monitoring health status
2. The use of materials resistant to twist
3. The online detection and automatic alarms
4. Advanced positioning mechanism

This system tree sections are included. They are WS, PPU and MSC (FIG 3).

terprets

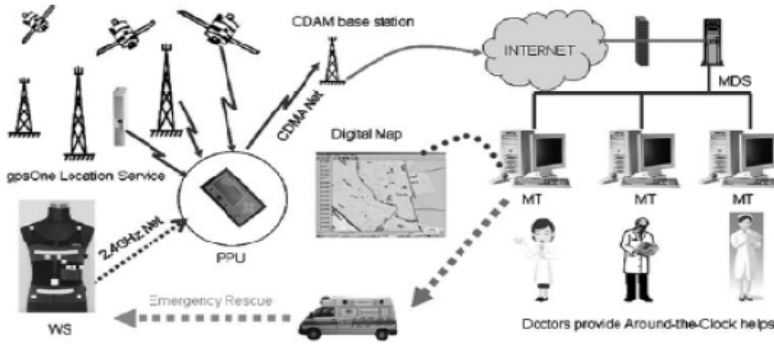


FIG 3: Mobihealth system

### Speech-Audio Interface for Medical Information Management

A prototype system is designed to be user-driven through the physical limitations and cognitive systems engineering in the field of health information management capabilities of mobile devices overcome. This solution uses the patient's electronic records.

To ensure fast and accurate interpretation of the input speech in grammar and vocabulary is limited [12].

Grammar and vocabulary used to describe medical events is used by doctors. When men and women with a variety of accents have been tested in a tranquil environment, the system typically no more than 90 percent of the entries in the first try, is known. The background noise is typically diagnosed in 70 percent and 80 percent, respectively [12].

Figure 3 is a simplified representation of the overall system

### 1. Design system for telemedicine (proposal system)

A good system, ease of installation and use. Household sensors put in place around the house and turn it by wireless network very easy, in some cases this may require wearable sensors are easily. The system should be designed in such a way that its maintenance is easy and convenient. The system includes a service station in the hospital and at home several stations [13].

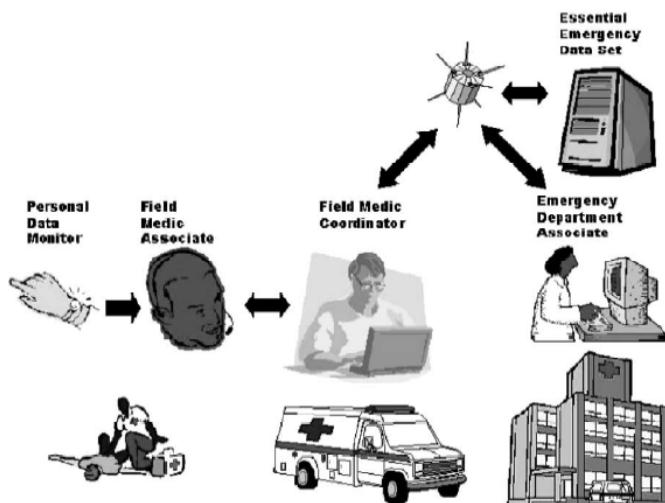
At the hospital, any doctor with a computer connected to a hospital server, equipped with a large screen, a webcam with USB, microphone and speaker works.

Home of a PDA with a mobile communication system card to access the Internet. A USB camera to take pictures of the patient's home, microphone and speakers, as well as sensor data storage devices are part of this system.

For storing still images and patient information received from the home, a database system is introduced [14].

To help doctors to make medical history at the service station, search and clear operation is intended. Using broadband or wireless internet in every home is connected to the hospital and several public duty doctors will have to diagnose the problem.

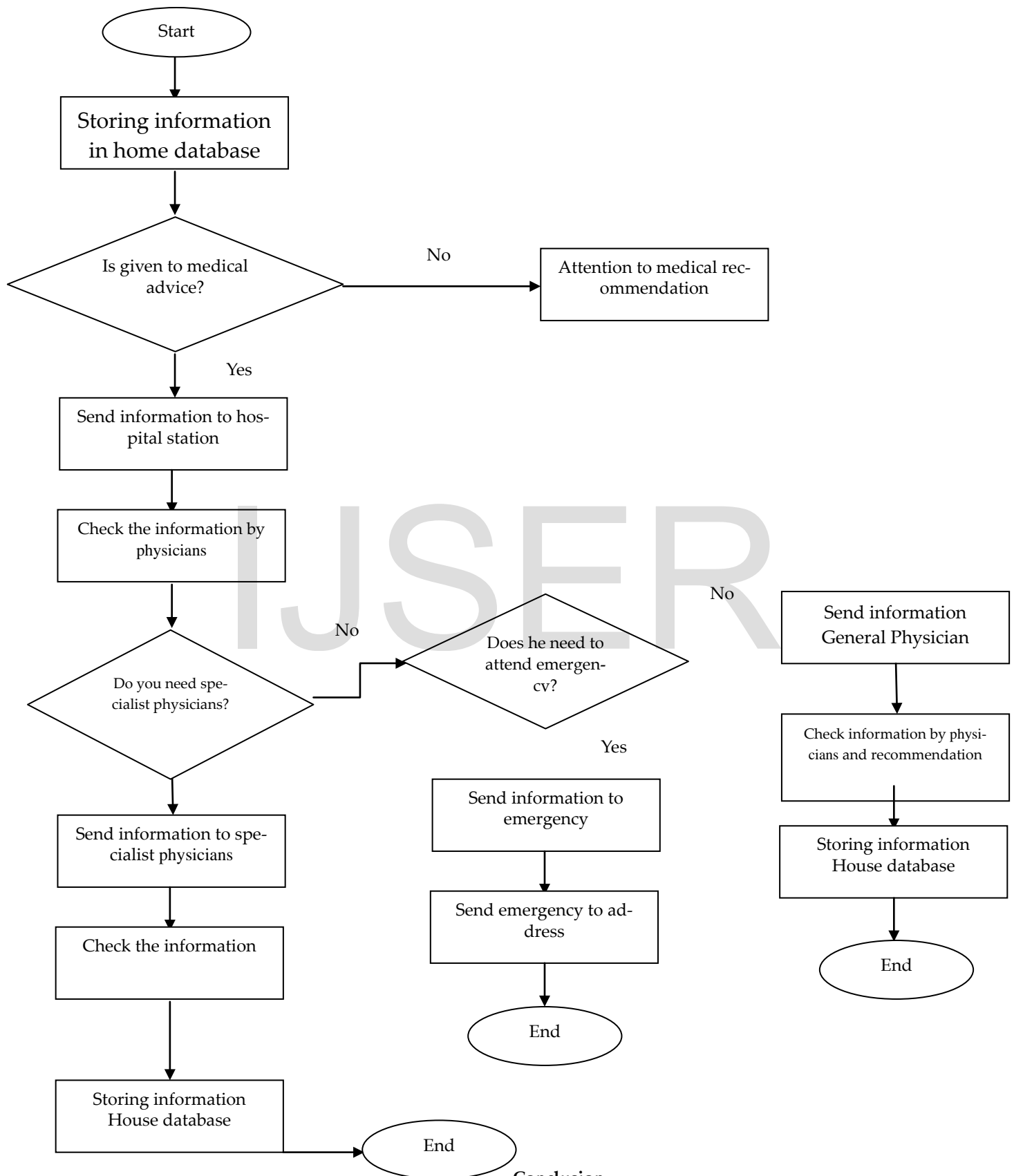
Using broadband or wireless internet in every home is connected to the hospital. Otherwise, the hospital's internal network or Bluetooth works by Zygy. To send patient information to the physician and the patient referred to a specialist messaging the information. In the elderly or patients who cannot use the system information for doctors trained nurses are sent. If you need to refer to the disease and otherwise help by giving hints and medicine to the patient. Also, if you need to test or CT scan. . . It was the place to be introduced to the patient. Figure 5 proposed telemedicine system based on other theorizes.



architecture emergency medical information (fig 4).

FIG 4: Speech – Audio system

Speech and audio interface for medical devices was developed to give a direct response to user needs and express your study working conditions. This system has been successfully the vast majority of user input, even with loud background noises in-



#### Conclusion

Due to the numerous applications of telemedicine and remote



medical record documentation and the need to create a platform for the provision of health care organization are using technologies to speed, accuracy and quality of care provided to patients and ensure patients.

In recent decades, much progress in the development of telemedicine technology is backed by modern digital communications media, has been done. In many countries health care system is more close to the patient. Telemedicine, especially in countries like Iran, where the transport network is underdeveloped. The increasing request of patients, suffering of chronic diseases, who wish to stay at home rather than in a hospital and also the increasing need of homecare monitoring for elderly people, have lead to a high demand of wearable medical devices. Also, extended patient monitoring during normal activity has become a very important target. Low power consumption is essential in continuously monitoring of vital-signs and can be achieved combining very high storage capacity, wireless communication, and ultra-low power circuits together with firmware management of power consumption. This Technology allows the patient to move unconstrained around an area, city or country. In this paper the design a wearable monitoring system based on wireless networks, high storage memories, and Bluetooth and zigbee communication.

In Iran, due to problems such as poor transport networks and population density, lack of access to specialized medical centers, increasing aging population and need special care and increased medical costs, the need for remote medical systems more is necessary.

Telemedicine plagued by challenges related to limited reimbursement, complex telecommunication services, requirements for new practice patterns, the ephemeral and ever-shifting nature of health partnerships and the high fixed costs of building a hospital network, will need widespread endorsement by the medical community, hospital administrators and the federal government.

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