

Remote Health Monitoring and Health Care using Telemedicine System

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Abstract- Now a day, rural areas facing many problems related to health care services. In rural area lack of pharmacists, doctors and mental health professionals. Telemedicine system is one of the major forces shaping the future of health care. This system allows you to regularly monitor a patient's vital signs and glucose levels without you having to see them in person.

This system which includes continuous collection and evolution of multiple vital sign, long term health care and cellular connection to medical center in emergency case and it transferred all acquired raw data by the internet in normal case. The telemedicine refers to the utilization of telecommunication and networks technology for medical diagnosis, treatment, and patient care for remote places.

Keywords- Telemedicine, Patient, Hospital, ECG

I. INTRODUCTION

Mobile health-monitoring devices offer great help to both patient and doctors; doctors can focus more on tasks with high priority by saving time normally spent with treating chronically ill patients. In modern medicine, there are many methods to diagnose heart disease, such as electrocardiogram (ECG), MRI, CT, ultrasound and so on. Among these methods, ECG diagnosis is a low cost and convenient method of diagnosis.

Telemedicine systems can be used for monitoring of vital clinical parameters such as ECG from patients at home, and can be utilized to treat the patients in emergency condition not only in remote rural areas, but also in urban areas. [1]

The main telemedicine system components in recent years include bio signal sensors, processing units, data communication networks, and medical service center. The patient vital signal is acquired and then it is filtered using various digital filters and amplified using various power amplifiers. Initially the signal is analog and then it is converted into digital using ADC which uses sigma delta techniques. As today all electronics and communication uses digital signals which can be easy to process and control. [2]

The aim of telemedicine is to provide expert-based healthcare to understaffed remote sites through modern telecommunication (wireless communications) and information technologies. One of the benefits of telemedicine is cost savings, because information is less expensive to transport than are people. Advances in medical technologies have led to accelerated growth of the elderly population in many countries, resulting in an increasing requirement for home health monitoring to ensure that elderly patients can lead independent lives [3].

II. OBJECTIVE OF THE PROPOSED SYSTEM

One of the basic ideas of telemedicine can be expressed by the saying: "Move the information, not the patient". When a patient needs to consult a specialist, information about the patient could be obtained locally and exchanged through a network to a specialist. In many situations this can replace transporting the patient or the specialist to a given location. This exchange of information for medical diagnosing and treatment is a basic concept of telemedicine using the technology like image processing and video-processing. The investigation, monitoring and management of patients and the education of patients and staff using systems which allow ready access to expert advice and patient information no matter where the patient or relevant information is located. Telemedicine may therefore be seen as all situations where information is exchanged electronically between health care parties that collaborate in treating patients.

Ministry of Health defined 5 information technology (IT) objectives for the health care

- IT1: Improve service and quality of the health services.
- IT2: Improve productivity and efficiency in the health sector.
- IT3: When meeting IT1 and IT2 the aspects of security of privacy for the

- Individual patient should be considered.
 - IT4: Use the opportunities of IT to distribute information to the general public and the health care professionals and to increase the level of knowledge.
 - IT5: Improve working conditions and personal planning for healthcare professionals.
- These objectives relate to the whole of the health sector not only telemedicine. However, those objectives directly related to patient care may be used to form similar objectives of telemedicine. By combining IT1-5 objectives and the previous definition of telemedicine we have defined the following 7 objectives of telemedicine:
- TM1: Patients should be treated as close to their homes as possible (IT1).
 - TM2: Medical expertise should be equally available independent of where the patient lives (IT1).
 - TM3: The quality of medical decisions should be improved by making existing information about patients more easily available (IT1).
 - TM4: Patients should get more information and better service (IT1).
 - TM5: The health services should improve efficiency and productivity by reducing unnecessary administrative work such as retyping information already existing in electronic form and by distributing tasks between health care institutions and health care personnel (IT2).
 - TM6: All exchange of information needs to take into account the aspects of security of privacy for the individual patient (IT3).
 - TM7: Medical knowledge should be more easily accessible (IT 4).

III.DETAILS OF HARDWARE REQUIRED

A. System Decomposition

Mobile telemedicine directs a mobility aspect of patient, medical data, health services, and emergency team mobility. The system is based on the deployment of a mobile unit provided with computer, and diagnostic devices and processes. The unit is called Telemedicine (mobile/movable) unit, and supported by specially designed hardware and software. To match the Telemedicine Mobile Unit, the project will also develop a Base unit or Doctor unit that is placed in Medical center or any reference hospital. According to the most needed requirement of health services in India, the design system will be focused on application telemedicine for:

- Tele diagnostics

- Tele consultation
- Recording and reporting
- Distance education
- Other service applications.

A proposed system of the Mobile Telemedicine Unit is depicted in Figure 1, while Figure 2 describes a Hospital or Doctor unit.

B. The Mobile Telemedicine Unit

Basically the Mobile Telemedicine Unit consist of three blocks i.e. the medical devices that performs measurement and acquisition of medical data/information including a set of video camera equipment; the communication block , and a processing data unit.

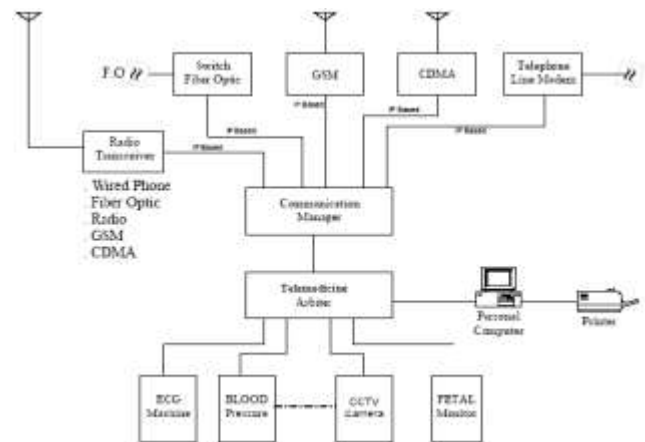


Figure 1: mobile telemedicine unit

IV. MEDICAL DEVICES BLOCK

Medical devices which are equipped in the unit may vary, according to the urgent medical services that mostly demanded by the community within the area of interest. Each of medical devices is connected to a Telemedicine Arbitrator that functions as an interface between the equipment's and the local PC. Moreover, the telemedicine arbitrator is also applied as a control unit for communication transaction to local PC and the communication manager.

Communication block

The communication block consists of two main parts, namely:

- Telemedicine Arbitrator
- Communication manager.

The arbitrator is responsible for data acquisition and or polling of medical record from various medical devices. Data will be saved in a Medical Data Base. One of the most important factor has to be taken into account is the possibility of serving wide range of data format. A special purpose software must be designed as a protocol for data exchange, and bio signals

acquisition modules to support the required system has to be developed as well.

Communication between the Mobile Telemedicine Unit and the Hospital Unit is implemented by using different communication mode. In order to carry this task, a communication module, viz. Communication Manager will be designed. This module provides an option for data transmitting according to the available communication link infrastructure, and consists of multi modem (radio, GSM, CDMA, Fiber optic). Operation of the module will be controlled by predefined software communication protocol to manage data transaction (data flow in – data flow out) that matches to format data based on available communication link, determine a kind of communication link, and maintain connection between the Units.

A. Processing Data Unit

A personal computer is used as a processing data unit. The selection of the computer depends on the application of the Telemedicine Unit, i.e. connection parameters to a high speed computer network that translate different data format (patient record, image, multimedia), efficient storage of data, and effective handling of growing number of system and user.

B. The Hospital Unit

As shown in Figure 2, the Hospital Unit consists of a dedicated PC and a Communication Manager. The PC is used for monitoring signals and data coming from the Telemedicine Unit. Incoming signals are bio signals measured by medical devices within the Telemedicine Unit. Data may be in a various format, and the data transaction is controlled by the Communication Manager.

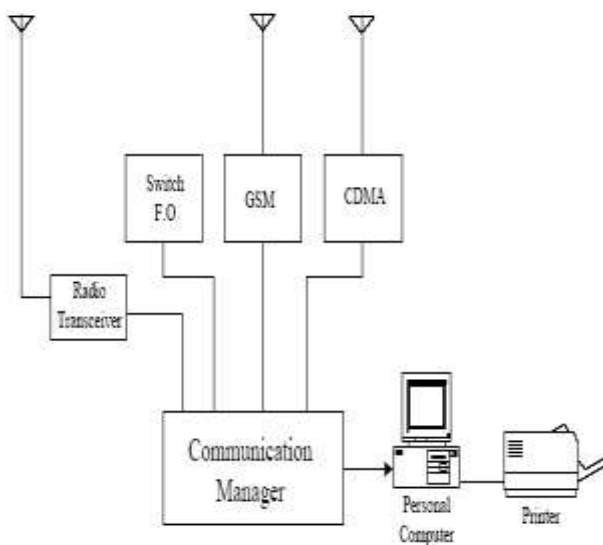


Figure 2: Hospital / Doctor Unit

V. MONITORING

Monitoring will be done as follows:

- Regular team supervisions (meeting/discussion) every week
- Set up project log book for each team member
- Coordination (coordinative team meeting) every two weeks, and as necessary
- Periodic meeting with associated policy authorities
- Periodic progress report every month.

A. Evaluation

This survey paper evaluation will be conducted based on technical performance, clinical evaluation and user survey.

- May 1997 : Invitation for a proposal by MCIT (then DOE) on Telemedicine over ordinary telephone lines.
- March 1998 : Submission of a Draft proposal in collaboration with School of Tropical Medicine and WECS (WEBEL).
- Jan 1999 : Starting of Project Work.
- Aug 2000 : A Prototype system developed (TelemediK Software Version 1.0)
- Nov 2000 : Installed in STM for in house training and demonstration.
- Feb 2001 : First beta test between STM Kolkata and IIT Kharagpur.
- Feb 2002 : Inauguration of Telemedicine between School of Tropical Medicine, Kolkata and Habra State General Hospital.
- April 2002 : Inauguration of the second nodal center at Cooch Bihar.
- May 2002 : Survey involving connections of six hospitals of Government of West Bengal is taken by WEBEL (IIT Kharagpur being the consultant).
- Nov 2002 : TelemediK version 3.0 with a better front end and flexibilities in users operations.

B. Technical performance

Technical performance evaluation consists of parameters, such as:

- Technology applied selection, concerning to compatibility, scalability, interoperability, and reliability of equipment and systems used that meet these requirements
- System design regarding to low-cost, high coverage, and secure data transmission. This system will be implemented over public wireless phone networks . On the other hand, sending a video and data stream through low bandwidth and low reliability media is another technical challenge which has to be

overcome instead of connectivity and quality of service.

C. Clinical evaluation

Clinical evaluation of the system will be implemented on the subject of the accuracy of the diagnosis which depends on the quality of transmitting data whether bio signals or images.

D. User survey

To gather data and/or opinion of the users of the mobile telemedicine, a questionnaire will be designed which covers areas concerned, i.e.

- Data security,
- Usability,
- Effectiveness,
- Interference.

VI. CONCLUSION

The telemedicine became a necessary in every healthcare system and may improve the healthcare system with great extend and can be used as a application of telemedicine infrastructure for rural community. This proposes the design and implementation of a wireless telemedicine system, in which all physiological vital signs are transmitted to remote medical server through both cellular networks in emergency case and internet in normal case for long-term monitoring.

REFERENCES

- 1) Santosh kulkarni ,S.G Kulkarni-Remote health monitoring using embedded system: *International journal of emerging research in management and technology* ISSN: 2278-9359(Volume-4,issue-6)
- 2) Latit Chettri- Survey on Mobile based Telemedicine System for patient monitoring and diagnosis for remote in Sikkim. Lalit Chettri *International Journal of engineering research and Application* ISSN : 2248-9662,Volume 5,Issue 3,(part 5) March 2015,PP.26-29
- 3) R. Anta, S. El-Wahab, and A. Giuffrida, *Mobile Health: The potential of Mobile Telephony to Bring Health Care to the Majority*, Inter-American Development Bank, 2009.
- 4) Hafez found - Implementation of Remote Health Monitoring in Medical Rural Clinics for Web Telemedicine System, *Int. J. Advanced Networking and Applications* Volume: 6 Issue: 3 Pages: 2300-2307 (2014) ISSN : 0975-0290