Telemedicine System for Medical Data Communication in Primary Healthcare

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Abstract

Recent developments in Electronics communications and information technology doctors will facilitate patient care more and more. Telemedicine systems are used for patient monitoring as well as diagnosis of diseases of remote area patients. The proposed system objective is to develop a low-cost telemedicine system which allows a reliable remote diagnosis health application such as emergency incidents, mass population screening and medical education purposes. The performance of proposed system is Video consultation (VC) which can improve access to specialist care especially for individuals who live in rural areas that are long distance from specialist clinics. The main objective of the present proposed work is to develop a video conference system to have direct interaction of rural area patients with expert to take health care and suggestions.
Keywords: Telemedicine, Video chat, Voice chat, Encryption, Decryption, c#

I. INTRODUCTION

Telemedicine is future of healthcare in 21st Century using Telemedicine one can reach to unreachable. Thus quality healthcare can be provided to any part of world by citing atone place. People living in rural and remote areas struggle to access timely, quality specialty medical care as specialist are more likely to be located in urban areas. Because of innovations in computing and telecommunications technology, many elements of medical practice can be accomplished when the patient and health care provider are geographically separated. This separation could be as small as across town, across a state, or even across the world. Broadly defined, telemedicine is the transfer of electronic medical data from one location to another. This transfer of medical data may utilize a variety of telecommunications technologies like ISDN, Internet, intranets and satellites.

A. *Telemedicine Video Conferencing (VC)*

As an integral component of tele health, high bandwidth video conferencing is used in medical personnel education, peer consultation, patient education, as well as direct patient care. Telemedicine video conferencing has experienced rapid growth in the last five years primarily due to advances in technology and changes in the medical care environment.

II. VIDEO CONFERENCING OVERVIEW

A basic video conference setup has a camera and a microphone. Video from the camera and audio from the microphone is converted into a digital format and transmitted to a receiving location using a coding and decoding device, often referred to as a "codec".Figure1 shows sender side processing.

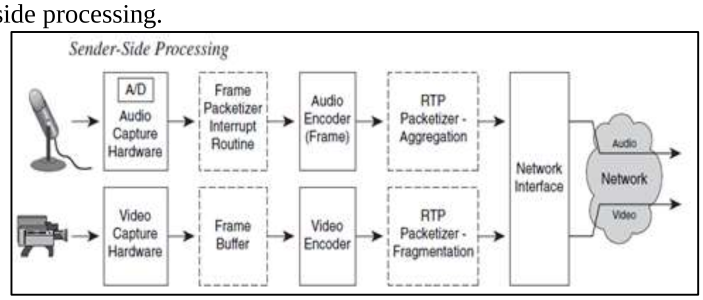

Fig. 1: sender side processing

At that receiving location is another codec device that decodes the receiving digital stream into a form that can be seen and heard on monitors or televisions. At the same time, video and audio from cameras and microphones at the received location is sent back to the original location.Figure2 shows receiver side processing.

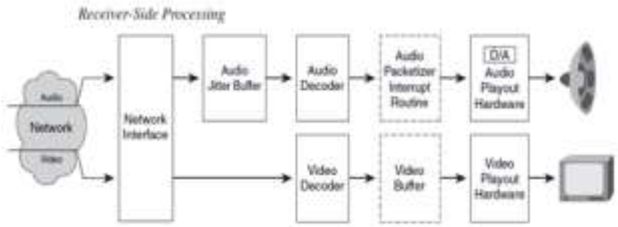

Fig. 2: Receiver side processing

III. HARDWARE

The block diagram of video conferencing of Telemedicine system shown in Figure3, which having following units.

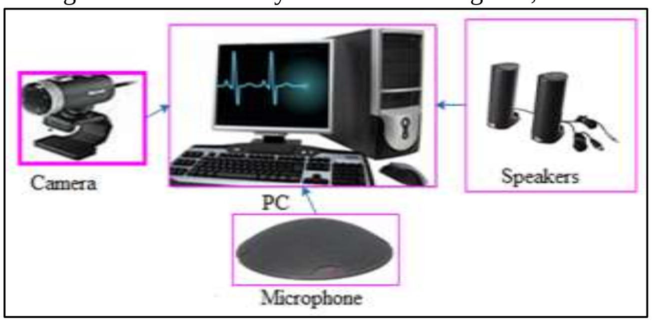

Fig. 3: video conferencing of Telemedicine system

B. Camera:

Camera is used to capture & send video during video conferencing. In this system Microsoft LifeCam Cinema HD webcam is used as video input device to capture video.

C. Microphone:

Microphone is used to capture & send audio during video conferencing. Microsoft LifeCam Cinema HD webcam is inbuilt with microphones, is used as audio input device to capture audio.

D. Speakers:

These are used to play the audio received during video conferencing. USB speakers are used as audio output devices.

E. Monitor or PC:

PC monitor is used as video output device to display the video received during video conferencing.

IV. SOFTWARE DEVELOPMENT

In proposed work the software used for video conferencing system was developed using Visual C# in visual studio 2012.C# is defined as a simple, modern, object-oriented and type-safe programming language derived from C and C++. Microsoft Visual C# is a powerful language aimed primarily at developers creating applications by using the Microsoft .NET Framework developed by Anders Hejlsberg of Microsoft especially for the .NET platform, C# derives its features from a number of languages like C, C++, and Java. C# makes it easier for developers to create, debug, and deploy enterprise applications. It has also been predicted that C# will become the favoured language for developing applications on the .NET platform.

A. Transmission Control Protocol/Internet Protocol (TCP/IP):

TCP/IP is a low level internet protocol that enables one to send data through a guided/wireless connection. The reason of choosing a low level internet protocol is due to its international standardization that enable most of the microchips connect to the internet via TCP/IP. The ultimate goal is to transmit the data from commercial tele health devices to the monitoring system for tele monitoring purposes. One needs to set the role of the server and clients to establish the connection between them through TCP / IP.

B. Database Tier:

The database tier is responsible for storage, retrieval, update, and integrity of the data to and from the presentation. The most common way to access the database is by using drivers that allow accessing a relational database management (RDBMS) to query or update the data records. The driver used in the implementation of the proposed system is JDBC drivers and the database is deployed on a SQL database server. The database tier provides the ability to do the following:
Store, retrieve, and update registered users, patients.

Store, retrieve, and update patient's record including his/her medical personnel's contact information and other details.
Store, retrieve, and update patient's consultations and drug prescriptions.

V. SYSTEM IMPLEMENTATION

Internet-based information exchange applications are one of the most common means of communicating today. As a matter of fact there are several varieties of chatting. The simplest computer chatting is a method of sending, receiving, and storing information with a network of users. This network could be WAN (Wide Area Network) or LAN (Local Area Network).The proposed system will deal with LAN and it is made up of two applications one runs on the server side while the other is delivered and executed on the client pc. If the client wants to runs application, enters his user name, password where the server application is running.

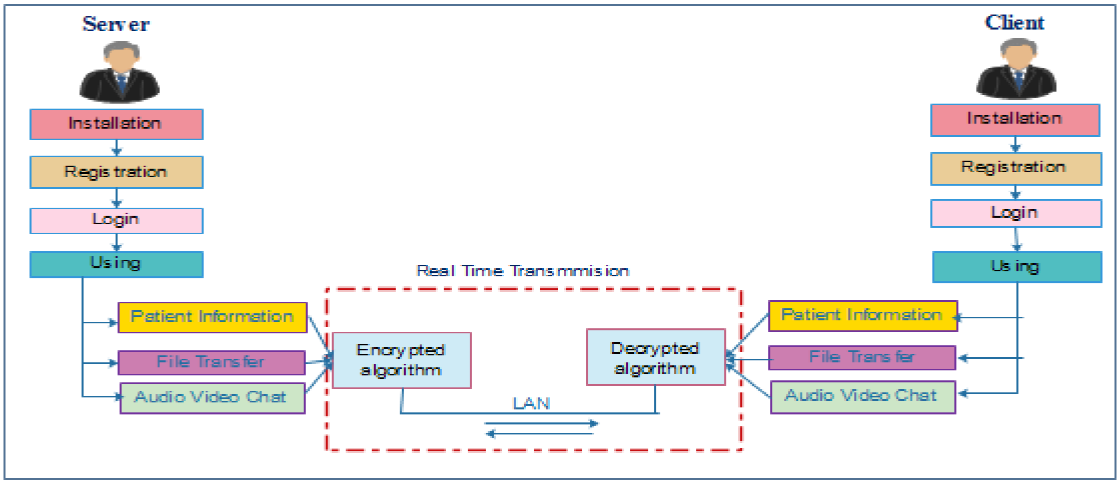

Fig. 4: send and receive service

This paper introduces design and implementation of information exchange in real time telemedicine system, this system provides several services for user's communication with each other. Figure4 shows send and receive service

VI. SYSTEM SERVICES

Start main server to establish the log-in to use video chat, voice chat, and file transfer and wait for client's request. Client gets IP for server pc from file administrator and shares it and connects to main server to get access to login after connected if client registers in proposed system he just enters user name and password to log-in to get all service else if client does not register he can creates account in proposed system. The proposed system consists of three services video chat, voice chat and transfer file, they will be summarized in turn:

A. Video Chat Service:

Wants to connect to other for exchange of information or learn by webcam, user provides the encrypted frame to be transmitted, the proposed new approach for network TCP/IP socket is used.

B. Voice Chat Service:

It provided the encrypted voice to be transmitted, the proposed new approach for network TCP/IP socket is used.

C. Transfer Files Service:

Everyone wants to connect to other for exchange of information or transfer any type of file (pdf, wave, doc, image, zip, etc.) user provides the encrypted file to be transmitted, the proposed new approach for network TCP/IP socket is used.

VII. RESULTS AND DISCUSSION

In main page user enters username and password. If the user is not registered he/she press on register button to enter next page called Registration form Figure5 show`s Login-form.

Fig. 5: Login-form

After user fills all fields in Register form and user presses save bottom then all information is sent automatically to database server, Figure6 shows Register fill page.

Fig. 6: Register fill page

The server checks information if the information is true it sends message to user “user account was created successfully, please log-in using your user name and password” if the user does not want register in system, he/she can press exit button and close the application. Now the user is registered in system enter username and password login to the next page, this page firstly welcomes the user or subscriber and offers three options, user selects what services to connect with other user, service connect consist of file transfer, video service and voice service. Figure7 shows welcome page.

Fig. 7: welcome page

When user1 wants to connect through voice chat with user2 she can press bottom back to back welcome page and presses connect to voice Service to enter to voice chat page. Figure8 shows Send and receive Voice chat.

Fig. 8: Send and receive Voice

Now the user user1 is login to the system, User can select any option she wants chatting. Whenuser1 wants to connect through video server with user2 she can press on button video chatting to enter to video chat page. If user1 press on save RX image button, it saves user2 captured image on user1 PC with entered file name.Figure9 shows Send and Receive Video frame.

Fig. 9: Send and receive Video

When user1 wants to send any type of file to user2 she can press on button File transfer to enter to Transfer File page. Then she open file from folder in user1 pc and send this file to user2.Figure10 shows Send and Receive file.

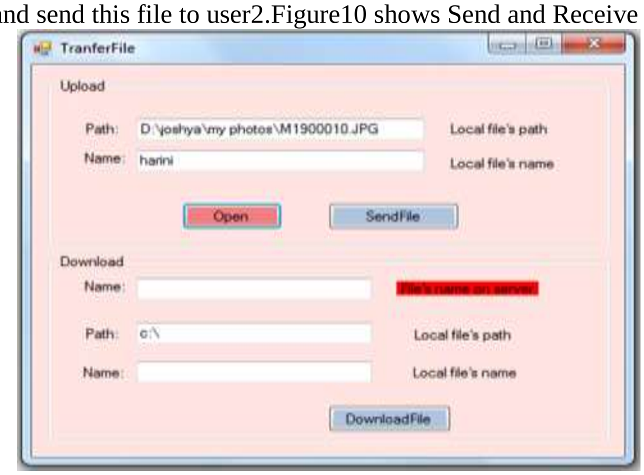

Fig. 10: Send and Receive file

VIII. CONCLUSION

The proposed system manipulates in an elegant manner the communication and data transfer process. Several conclusions are reached through design medical communication system.

This paper demonstrates the capacity of the proposed telemedicine platform to accommodate reliable communication of medical data. Low-cost implementation and ease of deployment can turn out to be a valuable tool for providing m-health solutions in developing countries, as well as for research purposes. The developed software with hardware system is implemented and providing video conference for both audio and video to have communication between the patient and doctor.

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