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Deployment of Telemedicine System Using Java Media Framework On Mobile Devices.

M S Saravanan^{1*}, and Rohit Kumar².

¹Professor, Department of CSE & IT, Saveetha School of Engineering, Saveetha University, Chennai, India.

²Final Year Student, Department of Computer Science and Engineering, Saveetha School of Engineering, Saveetha University, Chennai, India.

ABSTRACT

In today's world where technology has become the source of living there are places in the world which still lack behind and does not have enough resources so that technology can be developed. In this paper we have shown how the Java media framework can be used to develop a tele medicine system which could be used by the rural area people to get the diagnostic facility as soon possible where the high speciality hospitals are not present. The java media frame work is software which can be used to transfer the audio and video files from one remote system to a mobile device. At first a capturing device is used to capture the audio and video following which the software compresses the multimedia file to transfer it from one remote system to another when the recipient receives the file the JMF on the receiver mobile decompresses the file and the java media player is able to play the file on the system. Thus in this way medical images and other videos files can be transmitted from a remote system to a mobile device.

Keywords - JMF, Telemedicine system, Multimedia file, java media player.

**Corresponding author*

INTRODUCTION

Mobile devices have dominated this era of technology. In recent years the mobile technology has grown rapidly. Mobile devices have now become compact but yet have more features which make them more powerful. The high resolution cameras are widely used for many applications there are some apps which can be deployed on a mobile device for image enhancement. As it is cheap and portable people have totally deviated toward the mobile devices, all the works that can be done through a computer are now days performed by the mobile phones, tablets and other forms of portable devices. As the mobile networks are becoming fastest means of transmitting and receiving data it encourages people to develop new application which can be used for the benefit of the people [1]. One such application is presented in this paper, the mobile telemedicine using java media framework. The telemedicine is one of the fastest growing fields in medical technology where recent advancements happen every year; we have tried to combine the mobile technology that is networking and communication with the existing telemedicine system.

RELATED WORK

This paper aims to develop a Mobile base telemedicine system prototype for the health care industry and which can be used by the doctors and patients which enable them to transfer the audio, video and image files for the tele consultation service [2]. This system can be efficiently used by the distant area people where the high class hospitals does not exist to provide a diagnosis for treatment any kind of medical condition and to other healthcare facilities [3]. The main objective is to receive the data transmitted by the remote system on mobile and also the quality of image or any multimedia file received on the device should be clear and maintained.

Description of General healthcare Process

We have tried to design the system based on the study of general health care process. In this process we have the three major roles that is administrator, doctor and the patient. Now describing each role in detail we get to know what actually happens in a healthcare process;

Administrator

When a patient enter the hospital the first work is to get the admission for the diagnosis, this work is done by the administrator, the person in this position is responsible for the registration and collection of all details of the visiting patients. The second task performed by the administrator is to know the purpose of visit and assign appropriate department for diagnosis and consulting a doctor.

Doctor

The doctor is the medical expert who has the knowledge of all kinds of medical treatment and provides the diagnosis to the visiting patient; a doctor can also be an expert in one or more fields of the healthcare domain. When any medical emergency occurs or any patient who comes to visit the doctor the process of diagnosis starts with knowing the symptoms and giving the appropriate prescription of medicines to the patient.

Patient

A patient can be any person suffering from any kind of disease or any health related problems who comes to a doctor to get treatment and gets the advice of the doctor. On the basis of these three modules we can understand that how a health care centre or a hospital works. Now our aim is to develop this healthcare facility and deploy on the mobile devices where there is no need for people to visit the hospitals when they are in any case of emergency or at any remote place where hospitals are not present.

ANALYSIS OF EXISTING SYSTEMS

There are many systems which have been already existing and can be used to transfer the audio video files, there are also some applications that are used by the people to chat and have audio and video calls. We have given some examples as follows:

G-talk (Goggle Talk)

G-Talk is one of the application that is developed for messaging and provides both voice and short message service communication, It's communication is based on the servers which uses an open protocol (Extensible Messaging and Presence protocol) and can connect on both the sender and the receiver.

Skype

The Skype is also one such application which has lot of features such as voice video calling and many more. It is an internet based application which cannot be used if we do not have an internet connection. It uses Network Address Translation and supports a better voice quality. It also encrypts the calls end to end and store the user information in decentralised form.

Yahoo Messenger

It is also one of the application which supports all the functions such as instant messaging to friends, call and talk with your friends and also allows one to share the photos using this application. There are various requirements which need to be fulfilled before using a Yahoo messenger. Firstly the person who wants to use this application must have a yahoo account which means you need to sign up as a new user and make account as to use all these features. Secondly the friends of that person should also have the yahoo account on their names in order to get access to the features of the messenger [4]. Apart from these two requirements the other drawbacks are there is a limit on number of messages you can send in a specific period of time. If there is any problem with the messenger application there is no proper customer support to troubleshoot the error and give a proper solution.

Java Media Frame Work

The java media frame work is one such application programing interface which is developed to provide a framework for capturing, encoding, transmitting and playback of multimedia files [5]. Java media framework does not depend on the hardware or any operation system, it also encrypts the bottom up operations. It also has a feature of device independent and platform independent, so it is able to solve the compactibility or any interface issues with other devices. There are specific modules which have to be used by the java media framework which can be also called as main classes, they are defined as follows:

Capture Device

A capture device is the one which can be used to capture the audio and video, such as cameras, microphones, webcams etc [6]. This is the one of the man module of JFM because without a capturing device, no information can be generated to transmit through framework. The information captured is stored in an object which is called as Capture Device Info, this object is responsible to send the data to either to player or processor for further transmission [7], [8].

Processor

The processor here is used to interpret the media files that have to be transmitted. It gives a control over the processing stages of media using a program. The processor introduces a new state which is called as Configure to set the codec and the renderer classes. Thus the output of the processor can be directed to another processor if further processing is required or else given to the player to play the multimedia data.

Media Processing

The media processing comprises of stages such as multiplexing, de-multiplexing, transcoding and rendering. When multiplexing is performed the different media streams are multiplexed to single stream, for secure transmission change in encoded format is required which is done using a transcoder. The de-multiplexer extract the single stream from the composite format. The presentation of the media is done by the rendering process. Thus these are the various operations which are performed at the sender and the receiver side when any media is generated for transmission or reception.

Player

The player is another object which is used to play the multimedia file. The player requires a display screen and a speaker connection. The player object is used take the audio and video streams for the given input multimedia file and sends the audio signal to the speakers and video signals to the display screen. The player is responsible for reading the data from the digital video files.

Format

Format object takes care of the type in which the file is encoded or specified, The multimedia data is stored in two formats the audio format which can be (MP3) and video format which has further sub formats such as H361, H363, Jpeg, YUV, RGB formats. These formats are in which the video is present and the played object defined reads these formats while playback of a video stream.

DESIGN OF MOBILE TELEMEDICINE SYSTEM

The basic concept of this system is to provide a communication between the doctor and the patients, this system allows the patient to connect to a doctor and can use the system to have an audio video conference so that the instant diagnosis is provided to the patient. Here the Java media framework RTP Manager is deployed for transmission and reception of audio files. When the patient gets connected with the available doctor it sets a connection on both ends and enabling the transfer of voice data from sender to receiver and vice-versa. When the user at one end generates any sound, the audio capture device captures the sound generated, the processor is responsible for processing the audio file and sends the audio file to the receiver side the player on the other side takes the audio file as an input of streams and renders it to the available speaker, using this physical device the receiver is able to hear the voice transmitted. When the voice transmission occurs and before a player plays the audio video file, an instant player is created at first by the media manager. Once this has been done the other components such as control panel and visual components gets created. The player then prepares an object for the start and stop function of the player. The media processor is responsible for converting the received audio file to the given file format which is suitable for transmission over real time processing protocol. Next we need to see that the file is delivered to the correct location. A data sink variable is created and a media locator is introduced so that the actual destination can be specified. In this way the audio file can be send to the location which has been assigned accurately. Once the audio is transmitted we need to check for the video transmission, it starts with checking for the available capture device on the system and finding the media locator for that device. A data source is generated for the media which is used for storage and streaming of the multimedia file, before it gets transmitted the instance processor is created with the help of media manager. During sending of video file the processor goes through many phases such as configuring, un-realizing, realizing and prefetching. These processes starts parallel to the capturing of video track and in the next stage the video file is encoded compressed and is directed to the RTP manager. Once the RTP manager is invoked, it initiates the RTP session and specify the IP address and port number for transmitting the media file. On the receiver side there is listening port which detects the incoming video streams, this port will then transfer the video streams towards the available player using which the user is able to see the video file received.

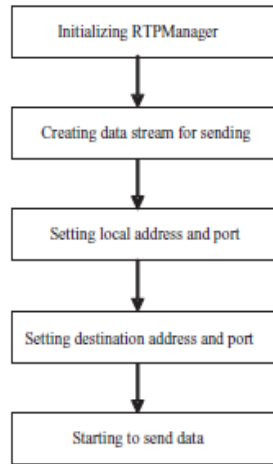


Figure 1. Transmission of audio video signals

Now the main objective is to receive the data on a mobile device, this is done with the help of mobile java communication framework. It is built on the IP multimedia subsystem core network. It is a new architecture which is designed by the Ericsson Research, which gives the telecommunication operators flexibility for delivering new services. The use of the IMS networks brought a network sceptical server model. Using this type of a model a combination of messaging, video and audio files were able to be delivered irrespective of the type of network the device was used to interface and better quality of service was achieved. Hence with the help of an MS network we cab be able to transmit the multimedia files on any network. Second challenge is to design a user interface application which makes it easier for the user to get connected with the available doctor and gives many options depending on the location and type of diagnosis needed. Thus at present the system is bale to transfer the multimedia files using the various java frameworks as specified earlier. Our next work for the future enhancement of this telemedicine system will be to develop a mobile application using which the patient can get connected to the doctor based on availability of resources and other constraints.

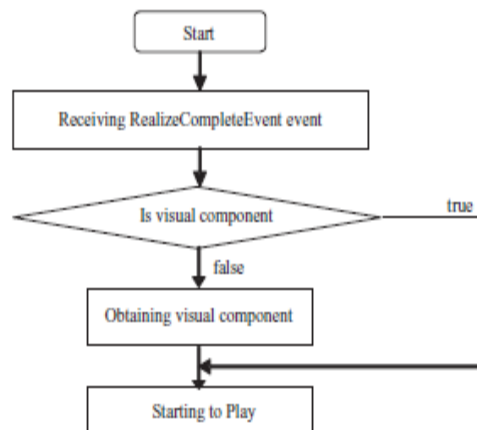


Figure 2: Reception and play of Audio video

CONCLUSION

Telemedicine system based on java media frame work has been explained and how the mobile devices can be connected with the existing system which can be used for audio and video conferencing and transferring of other media files. It also shows how the JFM can be used for transmission of multimedia files at low bandwidth, similarly the IMS network gives the freedom of delivering the files regardless of the network type. Our future work for the enhancement of this system is to build a mobile application which gives a user interface for the user to get connected with a doctor or nay health care specialist based on the availability of resources such as depending on location, time and other attributes.



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