A Telemedicine System over the Internet

Zhe Chen, Xiaomei Yu and David Feng

Biomedical and Information Technology Group
Basser Department of Computer Science
The University of Sydney
NSW 2006, Australia

Email: jan2@cs.usyd.edu.au

Abstract

Online telemedicine is the development of the Internet as a vehicle for the use of electronic information and communication technologies to provide and support health care when distance separates the participants. For more than 30 years, clinicians, health service researchers, and others have been investigating the use of advanced telecommunications and information technologies to improve health care. Although telemedicine is hardly unique among health care services in lacking evidence of its effectiveness, the increasing demand for such evidence by health plans, patients, clinicians, and policymakers challenges advocates of clinical telemedicine to undertake more and better evaluations of its practicality, value, and afford ability. Web-based telemedicine systems have been attempted by many researchers, and the most approaches are experimented with the use of videoconferencing for remote consultation. However, current telemedicine applications are usually developed for doctors to do consultation and case study between several hospitals. It is possible for patients to see doctors at home via Internet and it might be a part of life style in the future. In this paper, we developed a patient oriented web-based telemedicine system, in which a novel secrete key encryption/decryption scheme is also developed for payment security. The system could be easily extended to the Picture and Archive Communication Systems(PACS) system.

Key words: ***telemedicine, teleconsultationn, Internet, Intranet, Security, ASP, JAVA***.

Introduction

Because telemedicine is a new, seductive, and superficially easy-to-use technology, there tends to be a belief among health service managers that it can simply be made available to clinicians who will automatically accept and use the telemedicine systems [10].

With the advancement of information and communication technology, Internet connecting millions of hosts worldwide has been getting more and more popular recently [6]. Computer networks have made it possible to share electronic medical records and to deliver medical expertise via remote consultation.

Current information Systems do not satisfactorily support these characteristics of telemedicine due to they are still record-oriented instead of case oriented, and users cannot directly see an associative and explicative picture of a case[4].

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The major features of the system

The major features of the system are described as following:

- Provides the efficient and convenient methods for patients and doctors to communicate with each other and allows patients to send their medical data/image through the Internet.
- Provides a circumstance for "Case Diagnosis" and "Case Consultation" on the remote situation ;
- Build computer-based patient records and other electronic information systems that provide relatively easy and fast access to large databases and that permit the application of powerful statistical methods for analysing and displaying those data;
- Formulates strategies for proving information to patients, clinicians, and others in ways that promote informed decisions and stimulate desired changes in behaviours and outcomes;
- Potentially allows easier access to more information about a patient than the user either requests or needs.
- Automatically produces a payment including types of telemedicine services and would be divided into professional and facility components.
- Provides a secure web payment system and authentication procedures to ensure that messages are received from the stated source exactly as they were sent.

System Architecture

In this system, web server maintains the whole system, which includes System Management, and Database Management. System Management can been specified as a combination of Service System, Information System,

Entertainment System, Payment System, Security System and Department Administration System. And every system performs particular functions.

In the following, we will briefly describe two major subsystems, Service system and Security System.

1.1 Service System

In this project, the Service System is the most main subsystem of the whole system including the modules for "Case Submission", "Medical Image upload", "Case diagnosis", "Case presentation", "Case consultation", that provides the efficient ways for doctors, patients and consultants to communicate with each other through the Internet and to fundamentally alter the personal face-to-face relationship that has been the model for medical care for generations.

The module for "Case Submission" satisfies the medical needs inside a hospital, in the medical enterprise or globally. In general, a patient, who requests a consultation by submitting a case. In "Case Submission", any electronic medical records, such as text-based reports and digital medical images should be able to submitted. Subsequently. The "Specialist Selection" is an automatic process to select the appropriate specialists for the patients based upon various criteria. The "Case Presentation", as the interface to the specialist, should support the characteristics of human thought and communication, so that consultants can have an associative, explicative and complete picture of a case interactively. After obtaining all of the patient information, the specialists selected can then start their consultation. The "Case Consultation" module should not only be where consultants write consultation reports sent to the primary care physician, but also allow discussions of the case among consultants. The case consultation could either be real-time or asynchronous and it should support text-based discussions. The results of the consultation will be archived into the patient database and will also be assessed in the module of "Outcome Assessment" [4].

1.2 Security System

Security and privacy are among the most critical problems of telemedicine over the Internet and they have to be well-studied before telemedicine practice on the WWW becomes routine [4]. Security here refers to network security and end-point security in a distributed environment.

Network security concern is due to a third party between a client and a server. Network security may be well solved by using the public key algorithms. By adding on top of TCP/IP layers a SSL to implement encryption technology. ASP and JAVA programs may give the chance to solve End-point security problem It includes: an E-commerce web site that stores sensitive information such as client's password and credit card number in an encrypted form and a password-protected web-based application that stores user passwords encrypted with a one-way hash function.

Conclusion

We have built an Internet connecting with an Intranet and worldwide web based telemedicine center to support remote medical consultations and patient management across global wide area networks and heterogeneous platforms. ASP and Java technology were successfully used to implement a low-cost telemedicine system that uses the Internet and desktop computers for interactive, hypermedia case presentation and teleconsultation. Potentially, the system is going to be integrated into the Picture and Archive Communication Systems(PACS) system.

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