ABSTRACT

The primary health objective of any country is to ensure equal access to medical services to all its citizens irrespective of the location of their residences. A new alternative model of healthcare delivery is needed that can meet the needs of those that the public healthcare system is trying to reach. Internet telemedicine is a new research area that exploits recent advances in telecommunications networks. It provides the potential for highly flexible medical services. Medical services can now be delivered to any location.

Diabetes is a damaging disease that makes six times likelihood of getting cardiac failure and the risk of kidney failure. Diabetes not only impacts lifestyle, it can also cause serious health complications. It is a major risk factor for heart disease, stroke, kidney failure, adult blindness and amputations. If diabetes is managed effectively, these complications can be eliminated. However, these patients need to be continuously monitored to enable the initiation of treatment within the crucial golden hour.

The available conventional methods of monitoring mostly perform offline analysis and restrict the mobility of these patients to a hospital or a room. This research work takes care of such situations by the design of a Web centric diabetes diagnosis telemedicine system that helps the patients to regain their independence and return to an active work schedule, thereby improving their psychological well being. The
objective of this thesis is to utilize the current information and communication technologies to meet the healthcare needs at any place, any time with much better qualitative levels and at lower costs.

The research carried out consists of four parts. The first part is the design of the developmental process of real time Web-centric intelligent health care diagnosis system to support the diabetes diagnosis and particularly focuses on the development process of its corresponding Web applications.

The second part is the design and architecture of real time Web centric telehealth diabetes diagnosis expert system and implementation of architecture including a hospital network, telehealth kiosk (patient) and Web server.

The third part is the object-oriented design of Web based telehealth care intelligent diagnostic system using UML notations with a high level model. The use case driven nature of modeling with UML ensures that all levels of model trace back to elements of the original functional requirements.

The fourth part is implementation of real time Web-centric diabetes diagnosis telemedicine system which includes a hospital network, telehealth kiosk (patient) and Web server.

This work proposes on a medical network based on state of the art medical kiosk that addresses the problems of providing preventive and diagnostic health care. The patients can directly enter and can be screened for diabetes with all the necessary tests that are fully automated. The Web centric diabetes expert system runs on a telehealth server and is connected to the kiosk through the World Wide Web
Based on the symptoms, tests taken and the previous history of the patient, a prescription is generated by the expert system that is sent to a hospital where the doctor is online. Any changes required can be made by the physician in the diagnosis and prescription generated by the expert system and sent to the patient at the kiosk end as a printout. A Web based telehealth system employs expert system rules to detect different kinds of diabetes and diabetes related diseases. The types of diabetes that can be detected with this system are type1, type2 and gestational diabetes.

This research is designed in UML and programmed via the dot net framework. The expert rules were developed based on the symptoms of each type of diabetes. The decision support system developed in this work is able to detect and give early diagnosis of the three types of diabetes, namely, type 1,2, gestational diabetes for both adults and children.

The telehealth care diabetes diagnosis solution is an intelligent health care environment that aims to ensure lifelong coverage of patient specific health maintenance decision support services using WWW. The functionality of telehealth care diabetes solution involves (a) generation and delivery of diagnosis and treatment of diabetes and diabetes related diseases (b) remote diagnostic services through the kiosk. It is an amalgamation of diverse computer technologies such as artificial intelligence, Internet, multimedia, databases and medical informatics to implement a sophisticated telehealth care delivery model.