Chapter 8
Android–Based Telemedicine System for Patient–Monitoring

M. A. Matin
North South University, Bangladesh

Riaz Rahman
North South University, Bangladesh

ABSTRACT

Telemedicine systems are based on a combination of advanced remote monitoring devices, telecommunication technology, and innovative software and hardware. As mobile phones become more powerful and perform more complex interactions between mobile devices to resident software and other server-based software, they have been recognized as effective tools for Telemedicine, and the merging of the Internet and mobile computing introduces new opportunities and challenges in the Telemedicine sector. This chapter describes the development and implementation of an Android-based Telemedicine system for patient-monitoring. The system utilizes Android devices as mobile access terminals for general inquiry and patient-monitoring services. Authorized users can also browse the patients' general data and monitor blood pressure (BP) on the Web application. The Web applications, written in PHPScript, and embedded into HTML, reside in a content server to store BP readings, patient records, clinic and hospital information, and doctors' appointments with patients. Moreover, a customized AJAX plugin is used to handle mapping and plotting. For testing our system, an Android phone was used to connect with the biosensor device that was clutched by the patient. Data were successfully retrieved from the sensor device and displayed on the Android phone as well as the website. The system shows how the Android based application can be feasible in remote patient-monitoring and patient data retrieval.

INTRODUCTION

Telemedicine is a relatively new and fast growing trend in the world of technology that uses telecommunication as a tool in the practice of medicine. It can be defined as the use of advanced telecommunication technologies to exchange health information and provide health care services across geographic, time, social, and cultural barriers (Choi, Krause, Seo, Capitan, & Chung, 2006). Recently, Telemedicine is being used by doctors, hospitals, and other health care providers around the globe although the concept is relatively new, but it is not a separate technology or a new branch of medical science. Also, it is not a new technique for curing all health problems nor will it replace people. This concept developed based on the need of personal health management and remote health monitoring. Personal health technology such as internet-based home monitoring and cell phone-based personal health records emerged in the first decade of the 21st century (Continua Health Alliance, 2008). Mobile phones using GPRS or EDGE technology offer a technically attractive solution to establish data transfer between patients and clinicians (Farmer, Gibson, Hayton, Bryden, Dudley, Neil, & Tarassenko, 2005). The majority of the population now has a mobile phone. Recent GPRS or EDGE enabled mobile phones possess a range of features that make them particularly suitable for such use. They can transmit and receive data in real time, they have a screen for the graphical display of data, and they have a small keyboard to allow entry of additional data. In addition, the computing power within a phone provides an additional resource for analyzing data (Farmer, Gibson, Hayton, Bryden, Dudley, Neil, & Tarassenko, 2005). Internet based monitoring system and mobile phones are the key tool for a well designed Telemedicine system. Lots of well designed Telemedicine system developed due to these reasons and this number is increasing day by day. This chapter describes Android-based Telemedicine system which provides a simple and easy but very effective integrated management system for the patient, general practitioner and pharmacist.

WHAT IS TELEMEDICINE?

It can be defined as "remote medical care" Telemedicine is a way by which patients can be examined, analyzed, monitored and treated, without being co-located with the doctor. Advancements in sensor, mobile and information technologies have created new opportunities in the field of Telemedicine to provide a better quality of life for individuals. Telemedicine field has seen a tremendous growth in the recent years in countries like the UK, USA, Greece, Japan, Canada, Germany and now in developing countries like Bangladesh where 70% people live in rural areas.

Two types of interaction are taking place in Telemedicine- the Real-time (synchronous) and the Store and Forward (asynchronous). The benefits of Telemedicine, particularly remote monitoring, are well-documented. It has been recognized in the health care industry where long-term continuous monitoring is the key element in caring people with chronic conditions such as cardiovascular disease. This avoids hospitalization and enables those in geographically isolated settings to access specialized and preventive medicine (Gay, Leijdekkers, & Barin, 2009). Distant monitoring has special efficacy for patients with chronic disease such as diabetes, congestive heart failure, chronic obstructive pulmonary disease, and chronic skin ulcers for which changes in vital signs can signal a need for medical intervention (Tahat, 2009). The development of embedded mobile technologies and IT technologies in the health care can be considered as both evolutionary and revolutionary. Telemedicine technologies can transmit data on a regular, real time basis and prevent hospitalizations by identifying and treat-

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