

DEVELOPMENT OF WIRELESS PATIENT DATA MANAGEMENT SYSTEM

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Abstract Wireless networking technology enables two or more computers to communicate and relay data using standard network protocols, without the hassle of network wiring and cabling. Wireless networking hardware requires the use of underlying technology that deals with radio frequencies as and data transmission. Hospitals, medical centers, and rural clinics will benefit from the implementation of wireless technology particularly cell phones and PDA (Personal Digital Assistant) to healthcare field. Healthcare providers especially physicians and nurses will experience a more pleasant working environment, reduced workload and saves time and energy. More importantly they will be able to provide the point-of-care to patients and ensure that patients get the best of healthcare services. This project develops a wireless patient data management system using ASP, and this data management system should be able to be accessed from any devices that have wireless internet connection, including cell phones and PDAs. To simulate the results from the programming, Openwave Simulator is used to visualize the real outcome if a cell phone integrated with GPRS (General Packet Radio Services) or WAP (Wireless Application Protocol) technology had been implemented instead. Currently the users of this system view patient list, add patient or information about the patient profile, and prescribe medication to the patient. Unauthorized personnel will not be able to enter this wireless patient data management system. The authentication procedure is very important in protecting patients' information, and from the malicious attacks of unauthorized intruders to the patient data management system. The feasibility of using a mobile phone to retrieve patient data is still in the infancy stage, worldwide. With the rapid development of wireless technology, wireless technologies will soon appear in Malaysian healthcare industry.

KEYWORDS: Wireless technology, healthcare, handheld devices

Introduction

The wireless networking terminology refers to the technology that enables two or more computers to communicate and relay data using standard network protocols, but without the hassle of network wiring and cabling (Jorge *et al.*, 2005).

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Hospitals, medical centers, and rural clinics will benefit from the implementation of wireless technology particularly cell phones and PDA to healthcare field. This project attempted to develop a wireless patient data management system using ASP. This data management system can be accessed from any devices that have wireless internet connection, including cell phones and PDAs. Currently the users of this system can view: the patient list, add patient or information about the patient profile (which is strictly only for the administration staff), and for prescribing medication to the patient (which only a physician are able to access). Unauthorized personnel will not be able to enter this wireless patient data management system since one must have the correct combination of password and username to be able to retrieve information from these pages.

Methodology

In the development of this system, several methods were implemented. A research has been conducted to determine the best wireless technology to be applied in this project and the best choices of wireless technology to be deployed in the development of this system are GPRS, WAP and ASP. For this project, 11 make-believe patients and their personal information are stored in a database using Microsoft Access. Essentially a table is a repository for sets of related information. In this project it includes patient's name, parent's of patient's name, IC or passport number, date of birth, birth place and phone number. A database containing records of patients had been developed, and these data is retrieved to a WAP page using ASP programming. To simulate the result from the programming, Openwave Simulator is used to visualize the real outcome if a cell phone integrated with GPRS or WAP technology had been implemented instead.

Results and Discussion

PatientID	LastName	FirstName	Father'sName	Mother'sName	IC/PassportNumber	DateofBirth	BirthPlace	Address	PhoneNo
1	sellapan	sumathi	sellapan	litchurny	820201-04-5436	12/14/1988	melaka	melaka	06-3170517
2	ganasagaran	selvarani	ganasagaran	rajeswary	820714-71-5096	12/14/1988	india	penang	04-6462606
3	Akbari	yasmin	abdul rahman	mona	820714-71-5098	12/14/1988	penang	penang	04-6436726
4	Azad	Ali	Azad	rita	831214-05-5648	12/14/1988	kedah	kedah	04-6068854
5	Rani	agila	gana	rajes	831114-05-2683	12/14/1988	amerika	terengganu	07-5564213
6	Beng chung	Tan	Tan ah chong	Tan mei mei	791215-03-4457	4/25/1989	Johor	Kuala Lumpur	06-222654E
7	Anand	Raj	Markandu	patimala	641301-03-1255	12/25/1955	Johor	ipoh	04-5262653
8	Fahmin	Wan	Omar sukri	khatijah	820703-04-5565	12/14/1988	Kalantan	Kedah	07-2356891
9	siti	wan kembang	abdullah	fatimah	490201-06-2275	1/2/1975	terengganu	sarawak	05-6654213
10	surya	michael	thomas muthu	jennifer	881214-01-06	12/14/1988	kedah	penang	06-252533E
35	Mohd Yatim	Nurazliya	Mohd Yatim	Rosnah Hussin		7/12/1983	Kajang	111 Lorong Syed H	
36	Mama	mama	nnn	nnn		11/2/1978			
	(AutoNumber)								

Figure 1. Patient database used in this project

Currently the system is able to list all patient names contained in the database, and one is able to view details of the patient data. A user with an appropriate authentication will be able to add new patient information and to prescribe treatments to a particular patient. A wireless patient data management system

was developed using ASP with the concept of trial and error. The program was tested and ran using a mobile phone simulator which actually represents the real mobile phone in a real world condition. An Openwave 7.0 mobile phone simulator from the website http://developer.openwave.com/dvl/tools_and_sdk/openwave_mobile_sdk/phone_simulator/index.html had been installed and used in this project.

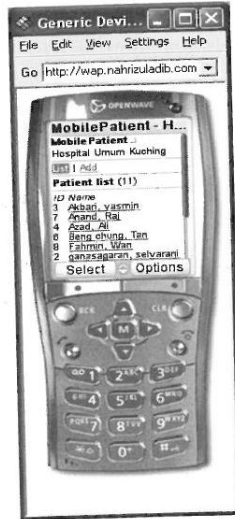


Figure 2. Sample of patient list retrieved on a mobile phone simulator

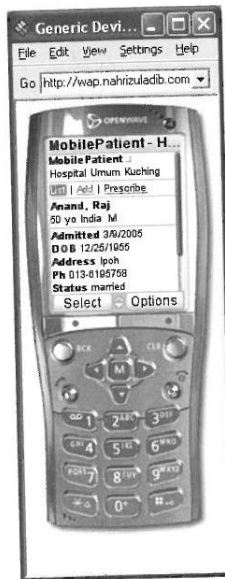


Figure 3. Retrieved patient personal information



Figure 4. Patient medication prescription form

Conclusions

Healthcare providers can access the patient database system with any handheld devices with an Internet connection. In the hectic and busy environment in a hospital, a handheld devices that can access the patient database system anytime, anywhere will proved to be a great tool. Two of the most widely used mobile gadgets for healthcare field are mobile phones and Personal Digital Assistant or better known as PDA. These devices enable clinicians to access vital patient information at the point of care so they can update records, place orders and make informed decisions quickly and efficiently (Ratib *et al.*, 2003). Hospitals and medical centers all over the world, at a slow but accelerating pace, are beginning to adapt their clinical systems to wireless networks, tackling patient safety, workflow, even billing, directly at the point of care (Stallings, 2002). This project enables handheld devices such as mobile phones and PDAs equipped with GPRS or WAP for the user to be able to retrieve information from the patient database system via ASP. Doctors equipped with GPRS and WAP enabled mobile phones can access patient records, data, and medication or drug list from the pharmacy via a mobile phone from the patient's bedside. They are able now to embark on ward rounds without having to go through the time-consuming process of collating numerous paper documents beforehand, they can now access electronic records from the patient's bedside (Tang *et al.*, 2004). This is one of the many proof that a wireless patient data management system is indeed a time and energy saver to the doctors and healthcare providers.

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