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The future of health: Integrating medical health information systems and home health monitoring data into predictive Health systems

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Papers Published:

1. Electronics New Zealand Conference (ENZCon) - Predictive Health systems through the integration of home captured health data and medical health information systems. F. Rehman, O. Diegel
[F. Rehman, O. D. (2006). "Predictive Health systems through the integration of home captured health data and medical health information systems." Electronics New Zealand Conference]

Abstract

Health management systems have been around for a decade but none have offered the scalability such as the Internet. Personal patient health management has been the key issue behind deteriorating health. It has been realized that the patient can manage their condition at home while always staying in touch with a medical professional.

Research shows that hypertension, if regularly monitored at home, can be improved. Users who have access to modern technology can utilize this to manage their blood pressure. This thesis discusses the development of an application that inputs user blood pressure data at home and makes intelligent and predictive decisions for the patient. A statistical model is discussed, which can predict future trends in the user's blood pressure measurements and adjust acceptable threshold based on the patient's long term health.

By having the application running on a user's home PC, but with the data stored in a central location, telemedicine is made possible, as the patient's doctor or even the local health board has access to all patient data. If the system picks up any anomalies in the patient's data, a warning can be automatically issued to the patient or doctor so that intelligent decisions can be made to correct the situation.

The overall goal of this research was to develop a windows based / web based software application to capture patient data in a centralized environment for the health professionals to diagnose using up-to-date blood pressure readings.

The concept has been tested on a group of hypertensive users who had access to the software and their results were compared with a group who recorded their data using a conventional method. The collected data was analyzed and it was concluded that use of modern technology does help people manage their blood pressure among people with high blood pressure.

The success of this research will enable patients to manage their blood pressure, predict future readings based on a patient's history and give a medical professional the exact information needed in diagnosing a patient's condition.

Acknowledgment

I would like to take this opportunity to express my deepest gratitude to academic supervisors, Dr. Olaf Diegel and Dr. Johan Potgieter for their continues support and guidance during the course of this thesis. Without their support this work would not have been possible.

I would also like to thank the test subjects, who have taken part in the experiment. Without their effort, their time, the design of the experiment would not have been possible.

I especially would like to thank my family without whose support, encouragement and being there when needed most; this work would not have been possible.

And finally my friends who have continually pestered me about the progress of the thesis, which eventually led to the completion of this work; so my sincere gratitude goes out to my friends.

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Acronyms - Definitions of terms used

Term	Definition
Select Statement	The SELECT statement is used to select data from a table. The tabular result is stored in a result table (called the result-set).
API	Application Programming Interface
XML	Extensible Mark-up Language
XSLT	Extensible stylesheet language transformation (XSLT) is a language for transforming XML documents into other XML documents. XSLT is designed for use as part of XSL, which is a style sheet language for XML. www.dmreview.com/resources/glossary.cfm
RDBMS	Relational Database Management System. Used to store, process and manage data arranged in relational tables. Often used for transaction processing and data warehouses.
RS232	A standard interface between a computer input/output port and a peripheral device.
ASP.NET	NET is Microsoft's new programming technology which is now gaining acceptance and momentum. Soon, it will completely replace standard ASP. Glaserweb.com is already up to speed with .NET technology, and is fully ready for this switch. While .NET development is not as rapid (leading to higher production costs), it is significantly more stable, and runs much faster than older programming technologies, opening up new possibilities for web development.
Microsoft SQL Server 2000/2005	Microsoft SQL Server is a relational database management system produced by Microsoft. It supports a superset of Structured Query Language SQL, the most common database language. It is commonly used by businesses for small to medium sized databases, and in the past 5 years large enterprise databases and competes with other relational database products for this market segment.
MySQL 5.0	MySQL (pronounced "my ess cue el") is an open source relational database management system (RDBMS) that uses Structured Query Language (SQL), the most popular language for adding, accessing, and processing data in a

	database. Because it is open source, anyone can download MySQL and tailor it to their needs in accordance with the general public license. MySQL is noted mainly for its speed, reliability, and flexibility.
PHP	The PHP Hypertext Pre-processor is a programming language that allows web developers to create dynamic content that interacts with databases. PHP is basically used for developing web based software applications.
Microsoft Visual Studio	Microsoft Visual Studio is an integrated development environment by Microsoft.
.NET	A Microsoft operating system platform that incorporates applications, a suite of tools and services and a change in the infrastructure of the company's Web strategy.
Win32	Windows API is a set of APIs (application programming interfaces) available in the Microsoft Windows operating systems. A software development kit (SDK) is available for Windows, which provides documentation and tools to enable developers to create software using the Windows API and associated Windows technologies.
Web Server	A computer, including software package that provides a specific kind of service to client software running on other computers. More specifically, a server is a computer that manages and shares web based applications accessible anytime from any computer connected to the Internet.
Microsoft IIS 5.0	IIS (Microsoft Internet Information Services or Server) is a set of Internet based services for Windows machines. Originally supplied as part of the Option Pack for Windows NT, they were subsequently integrated with Windows 2000 and Windows Server 2003. The current (Windows 2003) version is IIS 6.0 and includes servers for FTP, SMTP, NNTP and HTTP/HTTPS. Earlier versions also included a Gopher server.
Apache	The most widely available HTTP server on the Internet. It supports the PERL and PHP languages.
JBOSS	JBoss (pronounced Jay Boss) is an Open Source J2EE based application server implemented in pure Java. Because it is Java based, JBoss can be used on any operating system that supports Java. The core developers are now hired by a services company named "JBoss Inc." founded by Marc Fleury,

	the writer of the first JBoss version. The project is backed by a worldwide network of partners. The company profits from a service-based business model.
Microsoft BizTalk 2006	BizTalk is a business process management (BPM) server that enables companies to automate and optimize business processes. This includes powerful, familiar tools to design, develop, deploy, and manage those processes.
Hot swappable	The ability to replace a component (e.g. disk drive, controller, fan, power source) while the system is on line, without having to power down; also referred to as hot-plug removable
Run Time	When a program is running, or executing, it is said to be in runtime. The term is mostly used by software developers to specify when errors in a program occur. A "runtime error" is an error that happens while the program is executing. For example if a program told you that 2 + 2 was 5000 that would be a runtime error. A memory leak where the program sucks up excessive amounts of system memory is also a runtime error.
TCP/IP	Transmission Control Protocol/Internet Protocol A protocol for communication between computers, used as a standard for transmitting data over networks and as the basis for standard Internet protocols.
HTTP	Hyper Text Transfer Protocol (HTTP), the actual communications protocol that enables Web browsing.
HTTPS	A TCP/IP protocol that is used by World Wide Web servers and Web browsers to transfer and display hypermedia documents securely across the Internet.
UART	A device, usually an integrated circuit chip that performs the parallel-to-serial conversion of digital data to be transmitted and the serial-to-parallel conversion of digital data that has been transmitted.

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