

**SECURED PATIENTS BIOMETRICS HEALTH MANAGEMENT SYSTEM USING  
FINGERPRINT SCANNER**

**BY**

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**A PROJECT WRITTEN AND SUBMITTED TO THE DEPARTMENT OF  
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BACHELOR OF SCIENCE (B.Sc.) DEGREE IN COMPUTER SCIENCE OF CALEB  
UNIVERSITY, LAGOS.**

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## **DECLARATION**

I, **ONANUGA OLUWADAMILARE QUAZEEM**, do hereby declare that this project is entirely my work and composition. The work embodied in this project has not been submitted in candidature for any degree and is not concurrently being submitted for any other degree. All references made to works of other persons have been duly acknowledged.

**Signature**.....

**Date**.....

## CERTIFICATION

We certify that this research work was carried out by **ONANUGA OLUWADAMILARE QUAZEEM** in the Department of Computer Science, College of Pure and Applied Sciences, Caleb University, Lagos. The research work is considered adequate in partial fulfilment of the requirements for the award of Bachelor of Science in Computer Science.

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## **DEDICATION**

I would like to dedicate this project to the Almighty God for grace wisdom, understanding, and the strength he gave me during this period and also to my parents for their support physically, emotionally and financially all through my project.

## **ABSTRACT**

*A Patient's secured health management system using fingerprint biometrics is a computerized system that gathers, creates, and stores the health records electronically and authenticates login with a fingerprint scanner. Electronic Health system helps the health sector in managing the records of patients and offering due diagnosis services. Over time it has been difficult to gather big data of health information because of the paper documentation process practiced and also, the system had need to assist on quick diagnosis process on any illness which was quite difficult too while forcing the manual process of sorting for records but by introducing this system will help contribute to the wellness of the above-mentioned challenges.*

*The system implemented had some useful information gathered from the internet and research journals and textbooks. The research prompted an interview which was dully carried out with a doctor who gave useful information on health and a programmer who suggested we adopt web base based. This project was implemented PHP, MySQL, HTML, CSS, and JavaScript for software development.*

*In conclusion it is therefore recommended that this system is proposed to improve the use of computer systems in the health sector for managing information where they are created, stored, retrieved, and used for patient wellness.*

**KEYWORDS:** *Health, information, Diagnosis, Electronic, Fingerprint, Biometrics*

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## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 BACKGROUND OF THE STUDY**

Application of ICT for the enhancement of healthcare services has been widely accepted in recent years by Milley (2016). Therefore, the importance of ICT in delivering successful virtual health services cannot be overstated, although not without certain accompanying difficulties. HMS may be vulnerable to fraudulent medical recording activities, robbery and duplication of medical data, problems in identification and verification of patients and inappropriate billing procedures. After the push towards electronic medical records, the desire for a trustworthy system of authentication in the healthcare sector has increased. However, millions of Nigerian people see physicians in clinics and in other healthcare providers every day; these encounters mostly create new or current medical records and thus include a patient record. This storage and recovery technique involves the use of reliable technology with effective user authentication. Patients want the confidentiality of their records to be maintained. A health care system with integrated fingerprint biometrics may therefore offer patients and healthcare workers with a certain degree of safety. Biometrics has altered the safety of hospitals and the health system. Biometrics is the computerized identification and checking of an individual based on physiological or comportemental features. Conventional techniques of biometric identification include ear form, fingerprints, face characteristic recognition, signature dynamics, voice checking, skin patterns.

## **1.2 STATEMENT OF THE PROBLEM**

Part of the difficulties facing the current system is: Patient information privacy and using passwords that are readily imagined may help unwanted access. Most computer networks are susceptible to assault or infiltration. Safety is also important while addressing medical information confidentiality. Furthermore, the capacity to monitor patient health remotely is extremely essential. Moreover, inadequate or misinterpreted records of health treatment may lead to incorrect medicines, which can ultimately kill the patient.

## **1.3 AIM AND OBJECTIVES OF THE STUDY**

This research seeks to develop a finger print biometric patient's health information system.

The specific objectives are:

- i. Examine the current system without biometric fingerprint.
- ii. Running the suggested system using a biometric fingerprint method
- iii. Develop a system that uses PHP, CSS, JavaScript, HTML and Digital Finger Printing Scanner simulation
- iv. The building of the Health Management System (HMS) to eliminate bulky work in hospitals and to tackle the lack of medical staff would enable users to verify their profile and associated information using their fingerprint biometrics.
- v. Develop a desktop application with user-friendly features.

#### **1.4 SCOPE OF THE STUDY:**

This study focuses on the creation of a fingerprint biometric information technology application for patients. Javascript simulated fingerprint technology, while patient information about the fingerprint technology verification security access is managed using a database system: the SQL, MYSQL server and the PHP programming language. Additional issues to be addressed are:

i. **Finger print Scanner:**

Fingerprint scanners are a technology that recognizes and authenticates a fingerprint of a person so that computer systems or physical installation may be accessed or restricted.

ii. **Computer Simulation:**

Computer simulation is the mathematical modeling technique done on a computer to anticipate the behavior or results of a real or physical system

iii. **Health Information System (HIS)** refers to a system for managing health information. This comprises systems for collecting, storing, managing and transmitting an EMR, operational administration of a hospital or a system that supports decision-making on health policies.

## **1.5 SIGNIFICANCE OF THE STUDY**

The Hospital Management System was designed and deployed (HMS). Healthcare professionals may utilize the system to maintain records and safeguard patient medical information. The technology is intended to improve the efficiency and efficiency of hospital administration overall. Biometric integration means increasing user trust in the system. Future biometrics in e-health systems will include DNA analysis, brain wave analysis, and skin luminescence. In addition, researchers aim in the future to develop a secure biometric mobile system.

## **1.6 STRUCTURE OF THE PROJECT**

There are five chapters in this study. Chapter One included an introduction and an outline of the history of research. The literature in question is discussed in Chapter two; the analysis, design, and methodology of the system are discussed in Chapter Three; the design and the results of the system are in Chapter four; the summary, conclusion, and suggestion are in Chapter four. The references, an annex that means: source codes and screenshots are included in the report.

## 1.7 DEFINITION OF KEY TERMS

1. **COMPUTER:** This is a gadget that can automatically be taught to do arithmetic or logical sequences through computer programming. Modern computers may follow widespread operational sets known as programs. These applications allow computers to carry out a variety of activities.
2. **HEALTH:** Health is the biological system's capacity to sustainably obtain, transform, allocate, distribute and use energy. The WHO defined human health more widely in the Constitution of 1948 as "a condition of full physical, mental and social well-being, not simply the absence of illnesses or diseases."
3. **MANAGEMENT:** Management consists of activities designing and coordinating the work of their personnel (or volunteers) via the use of available resources, including financial, natural, technological and human resources, to accomplish their objectives.
4. **INFROMATION:** Information is anything or form that answers any type of inquiry or resolves doubt. It is thus connected with data and knowledge, because data is value given to parameters, and knowledge is comprehension of actual objects or abstract notions.
5. **RECORDS:** Document that commemorates and gives objective proof of actions, events, outcomes attained or declarations carried out.
6. **PROGRAM:** Technology and science. Program (machine), technical configuration, including computers, which is stored in the memory of the machine or hardware for use. Computer program, a set of instructions performed by a computer that accomplish a particular job.
7. **SOFTWARE:** In contrast to the hardware from which the system is made, a computer program or simply software is a generic term that refers to a collection of data or computer instructions that teach the computer how to operate.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### **2.1 OVERVIEW OF PATIENTS ELECTONIC HEALTH INFORMATION SYSTEM**

An electronic health record (EHR) is an online patient record approach. EHRs are immediate, patient-focused records that provide information to authorized users securely and easily. While an EHR contains patient medical history and treatment history, it is designed to overcome standardized clinical information gathered in the issuer's office and may provide a wider picture of patient care. Could EHRs:

- i. Contain medical records, diagnoses, medicines, treatment plans, dates of vaccination, allergies, radiological imagery and laboratory findings and test results
- ii. Allow access to evidence-based tools that clinicians may utilize to make patient care choices

An EHR is marked by the digital creation and preservation of authorized medical practitioners' health information, which may be shared with other health professionals in more than one medical organization. The EHRs aim at exchanging information with other medical suppliers and agencies, such as laboratories, specialists, medical imaging centres, pharmacies, emergency centres, schools and workplaces, incorporating information from all medical practitioners.

##### **2.1.1 BIOMETRIC PATIENT'S HEALTH INFORMATION SYSTEM**

The health information system is a system that exclusively gathers, conserves, maintains or discloses biometric information concerning human health or the activities of health sector organisations. This idea includes topics such as regional routine information systems, disease surveillance systems, lab information systems and PAS systems (HRMIS). Overall, HIS represents an integrated effort to process, report and utilize health information and knowledge

for policy and decision-making, program action, results, and public-health research. Sound healthcare decisions require reliable information on sexual, age and socio-economic health at all levels. Political decision-making evidence leads to successful resource allocation and quality of service information and efficiency information may help to enhanced performance at delivery level.

### **2.1.2 BENEFITS OF HEALTH INFORMATION SYSTEM**

Health information systems tend to target efficiency and data management. The main drivers of health information systems are:

- **Collaborative care:** Patients often need treatments from different healthcare providers. Health information systems such as health information exchanges (HIEs) allow healthcare facilities to access common health records.
- **Population health management:** Health information systems can aggregate patient data, analyze it and identify trends in populations. The technology also works in reverse. Clinical decision support systems can use big data to help diagnose individual patients and treat them.
- **Organized & Coordinated Treatment Process:** Health Information System is a technology-driven system that makes the process of sharing protected health information (PHI) between organizations and providers hassle-free. Also, because of this system, patients can get seamless and coordinated treatment from healthcare providers. Especially, the patients whose diagnoses need cross-specialty treatment coordination and substantial medical information management get the maximum benefits from HIS. And above all, it improves the delivery of the care and outcomes of the patients.

- **Improved Patient Safety:** As you get easy access to patient data with the help of Health Information Systems, you can save all the information and share it across multiple databases to improve the safety of the patients. Even you can get notifications whenever there are any issues related to patients' health. For example, the healthcare providers can receive an alert from program security checking about the harmful effects patients may experience on any particular medicine if they have that without being prescribed.
- **Betterment in Patient Care:** By collecting and saving patients' information, including diagnosis reports, medical history, allergy reactions, vaccinations, treatment information plans, test results, etc., Health Information Systems provide the healthcare providers a complete and orderly framework that helps them interact with their patients in a better way and eventually deliver care to them in a more efficient way.

## **2.2 INFORMATION SYSTEM**

The system usually refers to a system of people, data records and activities that handle data and data in an organization and encompass human and automated business operations. The term information system in a restricted sense refers to the precise application software that is used for storing data documents in computer systems and for automating part of the information processing activities of the organisation. The business processes modeling disciplines describe the business processes that the reform system supports in the same way as the prison information system. In addition, the information system is a system receiving (input) data from its surroundings and manipulating it for information purposes (processing) (output). Manual or automatic systems of information.



## 2.2.1 ISSUES ASSOCIATED WITH THE PATIENT HEALTH INFORMATION SYSTEM

Despite the huge potential and opportunities that lie in HIS to radically transform healthcare and the healthcare sector, many issues are evident and imminent.

- **Increased Storage:** health information managers are experiencing an increase in the volume of information to be managed; increasing uptake of clinical information systems, which is adding to the complexity of managing and providing an integrated medico-legal health record; and increasing competition from the information technology workforce to manage the systems and data within them.
- **Safety:** Many healthcare organizations are embarking on implementing an electronic health record (HER) system. While there are currently no national incentives or drivers for doing so, the primary driver is enhancing patient safety and enabling greater efficiency and effectiveness of healthcare. The implementation of EHRs is new territory for many health information managers.
- **Accurate and timely clinical coded data:** There continues to be a focus on producing accurate and timely clinical coded data to represent inpatient care with greater attention on improving clinical documentation to optimize revenue as seen through coding and DRG (diagnosis-related group) outputs. The funding models now in place have resulted in increased organizational attention and pressure on healthcare activity data for funding purposes, that is, capturing and reporting all patient activity accurately and promptly.

### **2.3 SECURITY OF EMRS AND PATIENT PORTALS.**

One of the most widely established patients when they think about the usage of EMRs and patient portals is the safety of these new digital technologies. The security and confidentiality of data handled by healthcare software is more essential than ever as new EMRs grow comprehensive and connected through the Internet. Patient records have shifted from being maintained entirely by the health issuer to a shared confidentiality responsibility, which exists between healthcare providers, EMR software developers and patients who are now widely accessed. Intimate health information may include some of a person's most sensitive and personal data. Any breach of the security of these data may thus have a significant impact on the individual whose information has been affected.

### **2.4 FINGERPRINT BIOMETRICS FOR PATIENTS' HEALTH INFORMATION SYSTEM**

An imprint Biometrics is a method to identifying the unique physiological characteristic of a patient in the fingerprint. It is used to provide privacy and to protect the privacy of personal financial transactions. The many biometric methods include the face, iris, retina, fingerprints, manual geometry, hand writing and voice. Fingerprint Scan Technological know-how is one of the earliest biometrics that uses unique aspects of fingerprint to recognize and verify people's identification. Each fingerprint contains unique patterns and features. The sample is composed of strains and spaces. The traces are known as ridges, while the area between the ridges is called the valley. This pattern of the ridges and valleys is utilized for fingerprint verification and approval.

## **2.5 FINGERPRINT SCAN TECHNOLOGY**

Five key phases of the fingerprint scan technology are the collection of fingerprints, image processing and the identification of unique properties, the generation of templates and the matching of templates. The primary purpose of the technical expertise in fingerprint scanning is to collect the high quality of the fingerprint that can be further utilized. The typical forensic quality is fingerprint images with five hundred dots per inch (DPI). Picture acquisition is the technique of acquiring a single, personally different, fingerprint image of the man or woman. Image processing is the way the fingerprint image may be changed into a useable format. The improvement of images serves a key role in reducing distortions such as cuts, scars and grime. The location of one kind of feature is the next stage. Fingerprint has numerous different designs such as swirls, loops and arches, which utilize fingerprint technology. The fingerprint template is used for removing picture defects like scars or grime. This is completed using unique algorithms. The last stage is the verification and validation of the template.

## 2.6 REVIEW OF RELATED WORKS

### 2.6.1 DATABASE MANAGEMENT SYSTEM

DBMS is a collection of structured access and maintenance capabilities for one or more databases or database series, which allow all interactions with the database. Most current DBMS interactions are divided into four (4) major categories.

- i. **Data definition:** definition of new database structures, removal of database structures, modification of the structure of existing data.
- ii. **Maintenance of data:** insert new data inside existing database structures, update the data in existing data structures, removal of the data from the current structure.
- iii. **Data recovery:** the querying by end-users of existing data and the extraction by application programs of data.
- iv. **Data control:** establishing and monitoring database users, limiting the database access and monitoring database performance.

There are several HMS that make use of the password as authentication for patient records. Meanwhile, a lot more researches on techniques for fingerprint biometrics are desirable in literature, particularly those that integrate more than one-factor authentication scheme. Some of the biometrics-based HMS are discussed in this section.

Lampert developed an authentication scheme using a password for authenticating user access remotely. Darrell S. (2013) explained how the implementation of biometrics is used in identifying security issues and increase information security for doctors, nurses, and patients in healthcare industries. It also explores the contribution of biometrics in improving security measures within the healthcare industry for the protection of all the entities involved (doctors, nurses, and patients). Developed a smart-card system with a password authentication scheme

using biometrics technique and hash function. This system gave a secured and efficient Tele-care system.

The study gave a comprehensive overview of e-Health security challenges using biometrics technology applications for security and privacy issues in the health sector. The study showed a great opportunity for applying biometrics technology in eHealth for reliable security solutions. Manimekalai S. (2014) reviewed the different biometric techniques used in health care systems and proposed a new method for biometric health care system for the unconscious state of humans. The authors noted the hat health care system has entered into the cloud and particularly took the problem of heart attack patients as a case study.

L.R. Palmer, M.S. Al-Tarawne Delay.S., Dlay and W.L. Woo focused on Efficient Fingerprint Feature Extraction. This system converts the fingerprint image to a digital greyscale image and extracts fingerprint minutiae from the greyscale image. The image was represented by a 2D greyscale intensity level.

By using binarization the original greyscale image was converted into a binary image. This methodology was implemented in MATLAB and it shows the performance of the analysis results. The proposed system includes the stages of binarization, thinning, cleaning, pixel value, and minutiae extraction. After the cleanup process, it removes the redundant fingerprint resulting in few false minutiae and it can be detected and increase the computational level.

Alejandro Enrique Flores Zuniga & Khin Than Win & Willy Susilo had proposed the paper about Biometrics for Electronic Health Records. This provides the analysis of the biometric used in healthcare.

That makes the comparison with traditional identification issues and considering the global security issues, the contemplation of share care environment. The system improves security, discourages and detects fraudulent accessing accounts, and prevents impersonation. The sensitive information is secured and discouraging unauthorized access. Biometric features cannot be shared or delegated. Biometrically transactions are difficult to confuse.

### **2.6.2 HEALTH DIAGNOSIS SYSTEM.**

Medical diagnosis is the process through which the illness or condition explains the symptoms and indications of a person. It is generally called a diagnostic with an implied medical context. The diagnostic information is typically obtained through the history and physical examination of the individual seeking medical assistance. Often, one or more diagnostic procedures are also performed, such diagnostic testing. Post-diagnosis was sometimes regarded a kind of medical diagnosis.

Diagnosis is sometimes difficult since many of the signs and symptoms are unspecific. For example, skin redness (erythematic) alone is a symptom of numerous diseases and thus does not inform the medical practitioner what is wrong. So a differential diagnosis, which compares and contrasts many potential causes, must be carried out. This includes the correlation of multiple bits of information, followed by pattern detection and differentiation. Occasionally the procedure is made simple by a path gnomonic sign or symptom (or combination of many).

Diagnosis is an important component of a doctor's visit process. From a statistical point of view, classification tests are part of the diagnostic process.

## **2.7 SOFTWARE MODEL / DESIGN AND METHODOLOGY**

Defined methodology is a technique for social realities thinking and analysis. The approach is defined as techniques to explain how research goals can be achieved. All methods have been

described as procedures and strategies used to achieve the study objectives. There are links and differences: methods are the guidelines; methods are the instruments. In this research, our proposed system was assessed using the structured system analysis and design methodology (SSADM). The top-down approach was used to divide each subsystem into several subsystems and modules. Primary and secondary sources of data collection were used for acquiring the data needed to construct the proposed hospital system.

### **2.7.1 AGILE METHODOLOGY**

This provides a quicker method to development. This technique may satisfy the user's endless needs. The developer gets the requirements throughout the project straight from the user. This step results in the user account. This advantage has been agile. In spite of all this, there are still certain drawbacks to the agile approach. The disadvantage of an agile strategy is that no documentation is available that would make future software development more difficult. Another drawback is the agile approach that focuses on software capabilities and not the usability of software. This failure to utilize the user banned the usage of the program. The objective of this research was to find ways to improve and solve agile innovation drawbacks. The marriage between UCD (User Centered Design) and Agile is an example of this. This project was based on PRISMA. Systematic review of literature composed of many chapters.

### **2.7.2 WATERFALL MODEL**

The waterfall model is a breakdown to linear sequence stages, in which a specialized job is accomplished and each stage is dependent on the deliverables from the preceding phase. This is common in some fields of engineering Design It tends to be a less iterative and flexible technique in software production with mostly one-way developments in the design, beginning and analysis, design, construction, testing, usage and maintenance stages ("downstreaming" such as a waterfall).

The paradigms of waterfall development in the manufacturing and construction sectors have become prohibitively costly considerably sooner throughout the whole development process due to highly controlled physical surroundings. There were no acknowledged alternatives to knowledge-based creativity when it was initially used for software development.

### **2.7.3 REASON FOR CHOOSING WATERFALL MODEL**

#### **1. USES CLEAR STRUCTURE**

When compared with other methodologies, Waterfall focuses most on a clear, defined set of steps.

Its structure is simple each project goes through these steps:

- Requirement gathering and documentation
- System design
- Implementation
- Testing
- Delivery/deployment
- Maintenance

#### **2. DETERMINES THE END GOAL EARLY**

One of the defining steps of Waterfall is committing to an end product, goal, or deliverable at the beginning, and teams should avoid deviating from that commitment. For small projects where goals are clear, this step makes your team aware of the overall goal from the beginning, with less potential for getting lost in the details as the project moves forward.



### **3. TRANSFERS INFORMATION EFFICIENTLY**

Waterfall's approach is highly methodical, so it should come as no surprise that the methodology emphasizes a clean transfer of information at each step. When applied in a software setting, every new step involves a new group of people, and though that might not be the case at your company, you still should aim to document information throughout a project's lifecycle.

## **CHAPTER THREE**

### **SYSTEM ANALYSIS AND DESIGN**

#### **3.1 RESEARCH METHODOLOGY**

The primary research technique for this study is through observing and interviewing hospital administrators and physicians, in which I have collected enough information on health information. After numerous visits, certain observations regarding the existing system were simple to infer.

#### **3.2 METHOD OF DATA COLLECTION**

Data gathered from original sources in this study. During the hospital stay, observations were taken. The employees were often solicited for personal information. Other data sources include news and periodicals, Internet content, Microsoft Encarta premiums, seminars, lectures and personal research.

#### **3.3 ANALYSIS OF CASE STUDY**

Health IT Systems refer to any system which gathers, protects, retains or communicates health information to people or health organizations. This concept covers routine information systems, illness monitoring systems, laboratory information systems, hospital patient management systems and information systems for managing human resources (HRMIS). An integrated effort to collect, analyze, report and utilize health information, health policy information and decision-making, program action, results on personal and public health as well as research constitutes, in a wider sense, a well-functioning HIS. Good healthcare decision-making at all levels needs accurate data on health split by sex, age and socio-economic factors. Evidence-based policies may help to distribute resources and quality and efficiency information efficiently, and can lead to improved results at the delivery level.

### 3.3.1 ANALYSIS AND PROBLEMS OF THE EXISTING SYSTEM

The challenges facing the manual system of managing health information system are as follows:

- i. **Poor documentation of prisoner's health information:** Consequently, the usage of papers has proven chaotic in file management; documents are usually lost.
- ii. **Time wastage:** The consequence of this issue is a loss of time in manually categorizing patient health records.
- iii. **The slow method of entering records:** By using paper and pen, it is time consuming and sometimes irritating to record health status and other information.
- iv. **No flexibility in accessing records at will:** Because records are submitted in documents and do not have access to a universal database, it therefore limits the ability for users to get health records in an emergency.

### 3.3.2 JUSTIFICATION OF THE NEW SYSTEM

- i. Provide sufficient protection to the patient database prohibiting unjustified users from accessing user accounts.
- ii. To establish a central database for all information about the user.
- iii. To automate manual forms of activities for the use of paper and pen in hospitals.
- iv. To educate the student with particular emphasis on fingerprint scanners about the comprehensive information on patient information systems, database management and security in general.

### **3.3.3 DESCRIPTION OF THE NEW SYSTEM DESIGN**

Biometric Patient health information system is the developing idea of electronic health information gathering. It is a digital record that is able to be shared in various healthcare settings by being included into a broad information system linked to the network and exchanging information only through a biometrics (Fingerprint Authentication) process. Such documents may contain history of health, medical history, drugs and allergies, etc.

The biometrics system of the patient is intended to process the patient information database using fingerprint biometrics as a keyboard. The model has been simulated in this system to provide a demonstration of the system.

### **3.3.4 REQUIREMENT ANALYSIS**

System requirements are an information system user needs definition of requirements and equipment. The specific requirements of the system are thus recognized as user needs. These are the installed software for health information systems.

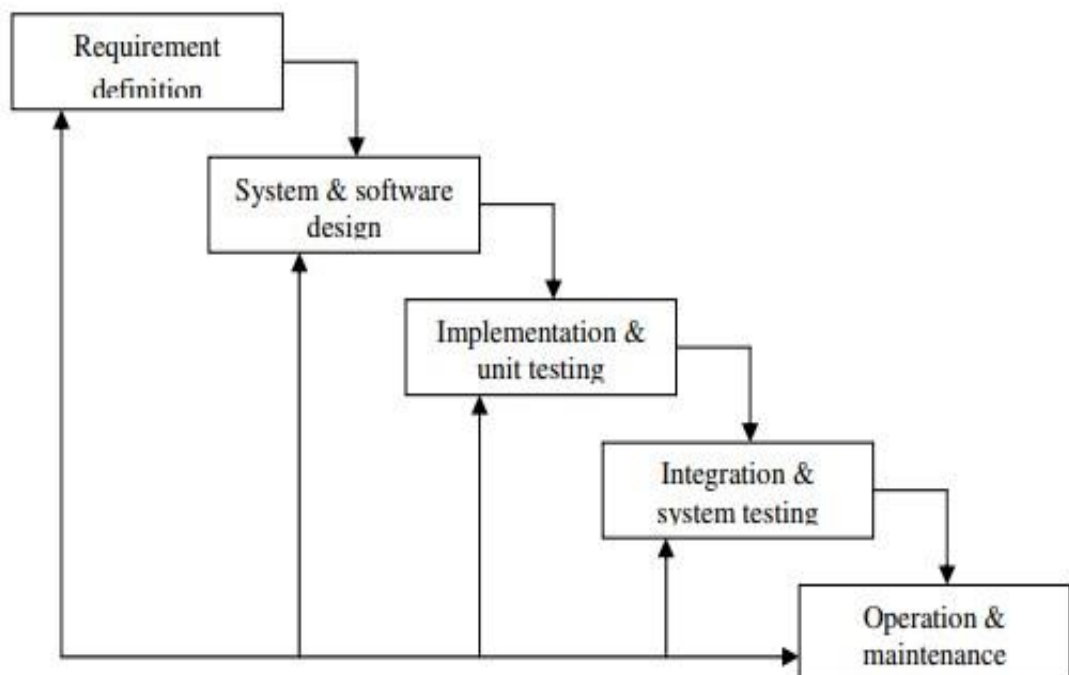
- i. program design
- ii. user interface design
- iii. procedural design

### **CHOICE OF PROGRAMMING LANGUAGE**

- i. PHP
- ii. JavaScript
- iii. HTML
- iv. MYSQL

### 3.3.5 ANALYSIS OF THE NEW MODEL

The main objective of this research is to create a viable computerized biometric health information system. This system was based on the waterfall model of the software development process, which the standard software model Winston Royce established in 1970. As shown in Figure 2, a linear or sequential performance is common throughout the different stages of the software development cycle. It provides enough documentation, discourages and allows tests at each step. It is iterative and allows systematic examination of past stages, a required system upgrading feature.



*Figure 3.1: Waterfall Model*

## **3.4 SYSTEM DESIGN**

### **3.4.1 DESIGN GOALS**

The goal of this project is to achieve the following program modules to handle the functionalities of the application.

- i. Home page
- ii. Admin Login
- iii. Upload patient's health information
- iv. Access information with fingerprint
- v. Management

### 3.4.2 SYSTEM ARCHITECTURE

#### Program-flowchart

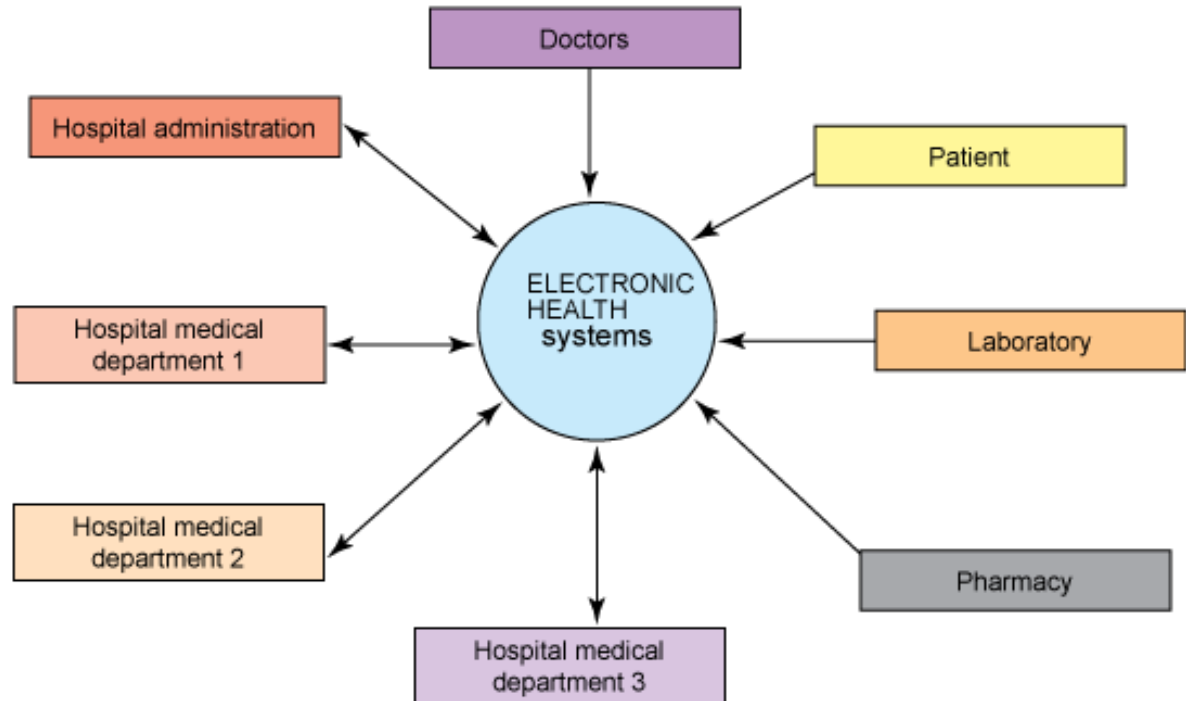


Figure 3.3: *Electronic Health Records: Manual for developing countries by WHO, 2015*

### 3.4.3 HARDWARE AND SOFTWARE PLATFORM

#### HARDWARE

- a. Processor Core i3
- b. 2. Speed GHZ 2.00
- c. The main memory
- d. 500Gb hard disk capacity

- e. 14-inch VGA monitor.
- f. Updates (uninterrupted power supply)
- g. Two Serial Port
- h. Standard or improved keyboard

## **SOFTWARE REQUIREMENT**

System and software applications comprise computer software. System software is software that comes with the system or is provided by computer manufacturers to solve a particular problem. Minimum Windows 7 operating system is required for the system.



### 3.4.4 DATABASE DESIGN

The database design view:

Account\_Module

Column	Internal relation	Foreign key constraint (INNODB)
id		
username		No index defined!
fullname		No index defined!
email		No index defined!
password		No index defined!

Admin

Column	Internal relation	Foreign key constraint (INNODB)
id		
username		No index defined!
password		No index defined!
updateDate		No index defined!

Biometrics

Column	Internal relation	Foreign key constraint (INNODB)
id		
userid		No index defined!
biometrics_id		No index defined!
username		No index defined!

## Doctors

Column	Internal relation	Foreign key constraint (INNODB)
id		
specilization		No index defined!
doctorName		No index defined!
address		No index defined!
docFees		No index defined!
contactno		No index defined!
docEmail		No index defined!
password		No index defined!
creationDate		No index defined!
updatationDate		No index defined!

### 3.5 CODING

- ❖ **PHP:** Hypertext Preprocessor is a server-side scripting language designed for Web development, but also used as a general-purpose programming language.
- ❖ **JavaScript:** JavaScript, often abbreviated as JS, is a high-level, interpreted programming language. It is a language that is also characterized as dynamic, weakly typed, prototype-based, and multiparadigm.
- ❖ **HTML:** Hypertext Markup Language is the standard markup language for creating web pages and web applications. With Cascading Style Sheets and JavaScript, it forms a triad of cornerstone technologies for the World Wide Web.
- ❖ **MYSQL:** MySQL is an open-source relational database management system. Its name is a combination of "My", the name of co-founder Michael Widenius's daughter, and "SQL", the abbreviation for Structured Query Language.
- ❖ **CSS:** Cascading Style Sheets is a tool used for specifying the presentation of Web pages, including colors, layout, and fonts etc.

## **CHAPTER FOUR**

### **SYSTEM IMPLEMENTATION AND RESULTS**

#### **4.1 SYSTEM IMPLEMENTATION**

A computer service has to react to and be flexible to meet the requirements of the system database that is the core focus of this study in order to serve the mission and strategic direction of the patient biometric information management system.

In order to achieve acceptable success in implementing this project, the following factors must be addressed.

- i. Design of cheap implementation scheme hardware. • Hardware configuration will be addressed in the future step.
- ii. Management of registration information online.
- iii. Continuous updates and upgrades of the systems and infrastructures created.
- iv. The network types are implemented.

#### **4.2 INSTALLATION REQUIREMENT**

- i. XAMPP Server
- ii. Laptop with 4 Gigabyte minimum
- iii. VS Code
- iv. Chrome Browser

#### **4.2.1 HARDWARE REQUIREMENTS**

- i. A hard disk of at least 500GB
- ii. 4 Gigabyte RAM Memory
- iii. Core i3 MHz
- iv. Window 7 operating system (Minimum)

#### **4.2.2 SOFTWARE REQUIREMENT**

- i. PHP programming language
- ii. VS code
- iii. XAMPP server

#### **4.3 PROTOTYPE OF THE DESIGN**

The prototype designs for patients utilizing biometric information management systems are as follows: Documenting on how to administer and maintain a new system is a smart programming practice to survive a time test. Implementing the system is the actual implementation of the new system for replacing the old system. Implementation of the system In addition, the system documentation describes what a program does and how it is to be utilized.

The new system may be used either via a step-by-stop process or by operating the old system and the new system simultaneously, until the system takes over the old system. Moreover, the

company's workers must be properly taught to use the new technology. This is to make the organization's maximum and efficient use of the new system.

#### **4.3.1 CHOICE OF DEVELOPMENT ENVIRONMENT**

- I. Macromedia Dreamweaver
- II. PHPMyAdmin
- III. XAMPP server

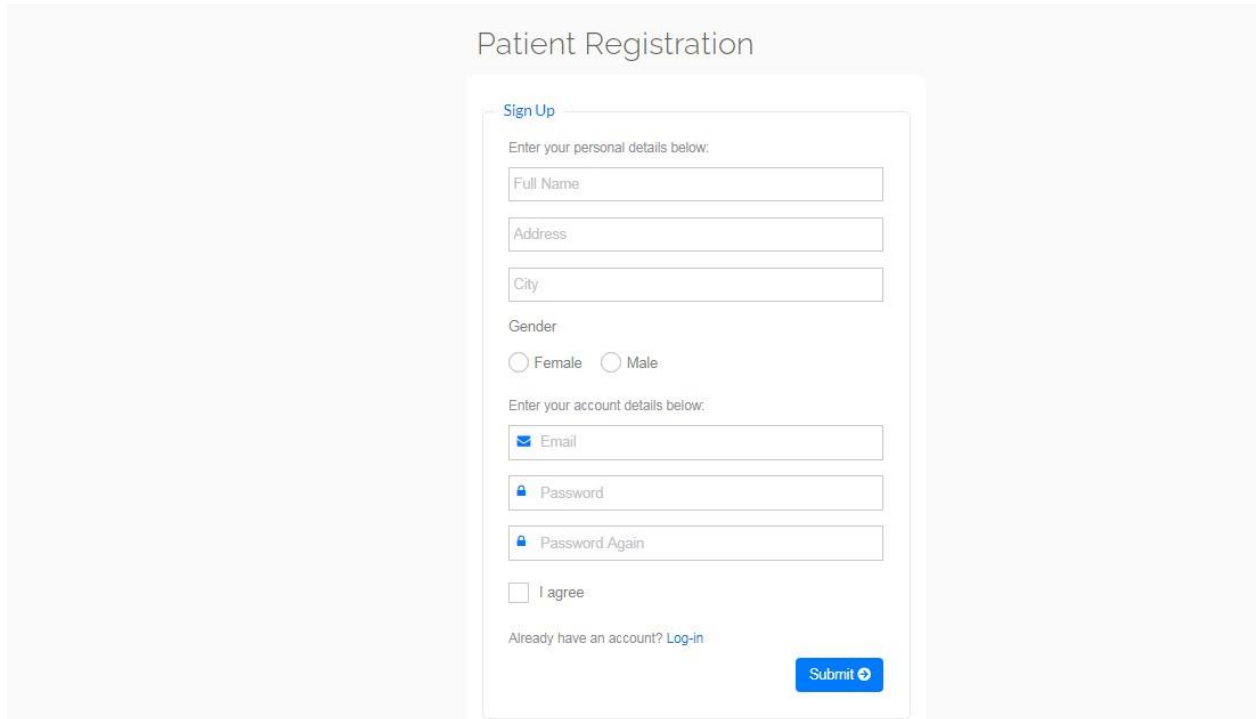
#### **4.3.2 SYSTEM TESTING.**

In the design stage, system testing was carried out to verify its efficiency and resistance to deliberate errors. System testing can be done in several stages which include:-

- i. UNIT TESTING
- ii. INTEGRATION TESTING
- iii. FUNCTIONAL TESTING

#### 4.4. PROGRAM SCREENSHOTS:

HOME / REGISTRATION



The screenshot shows a web form titled "Patient Registration" with a sub-section "Sign Up". The form is divided into two main sections: "Enter your personal details below:" and "Enter your account details below:". The personal details section includes input fields for "Full Name", "Address", and "City", followed by a "Gender" section with radio buttons for "Female" and "Male". The account details section includes input fields for "Email", "Password", and "Password Again", each with a corresponding icon (envelope, lock, and lock). Below these fields is a checkbox labeled "I agree" and a link "Already have an account? Log-in". A blue "Submit" button with a right-pointing arrow is located at the bottom right of the form.

Patient Registration

Sign Up

Enter your personal details below:

Full Name

Address

City

Gender

Female  Male

Enter your account details below:

Email

Password

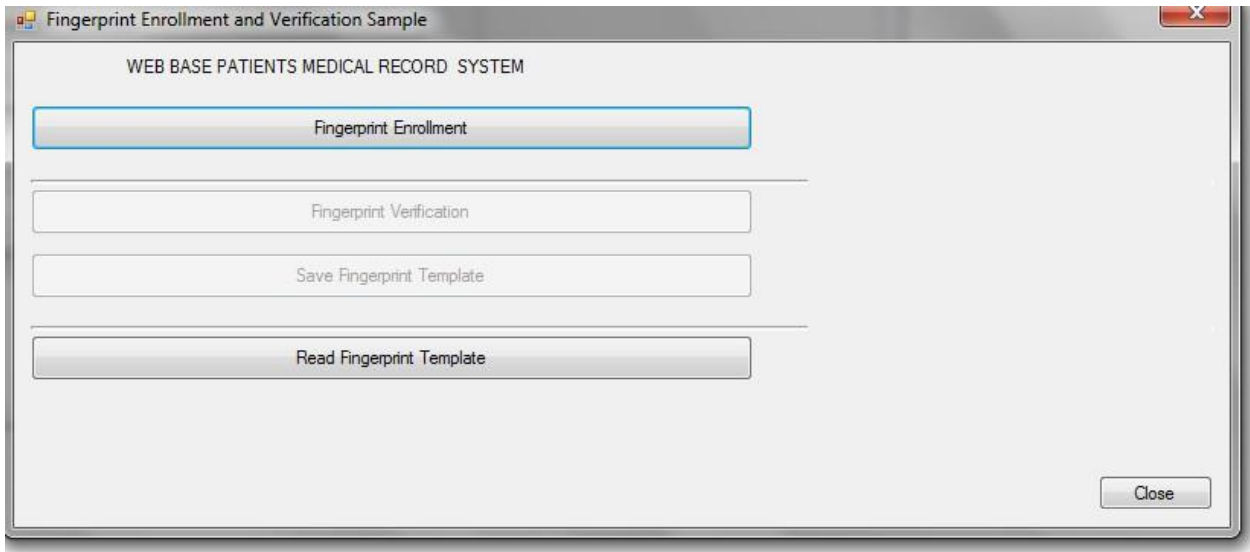
Password Again

I agree

Already have an account? [Log-in](#)

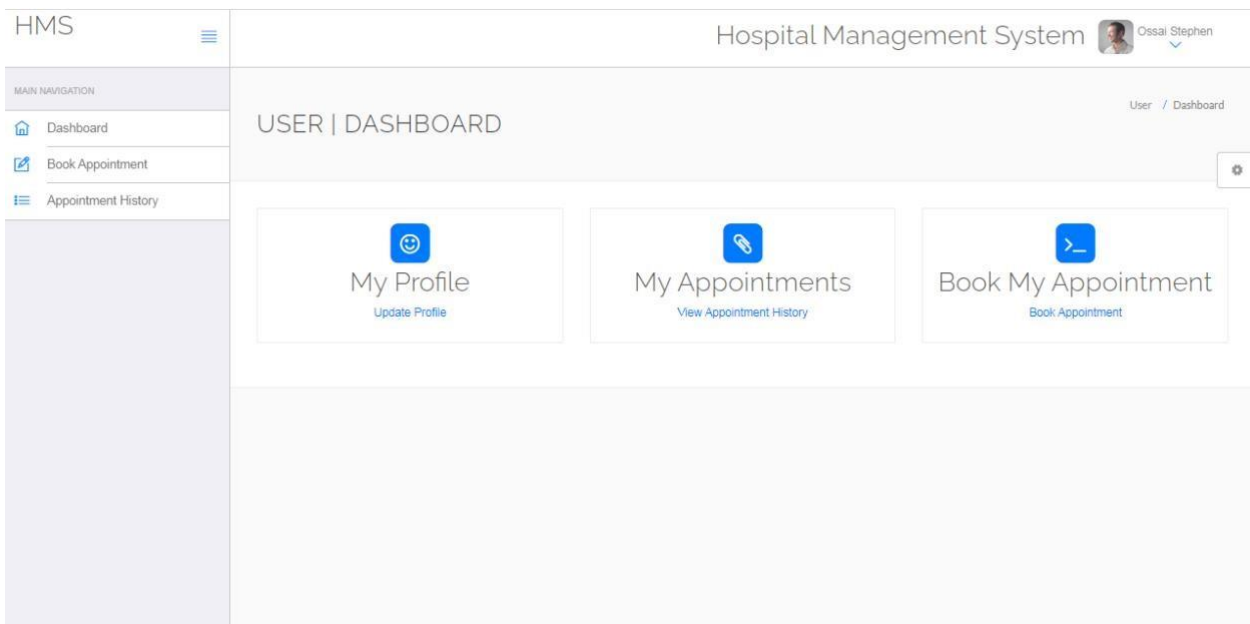
Submit

## ADMIN LOGIN / FINGERPRINT BIOMETRICS:



## ENTER HEALTH RECORDS:

## DASHBOARD



## Patient's Appointment:

The screenshot shows a web interface for booking an appointment. On the left is a sidebar with 'MAIN NAVIGATION' containing 'Dashboard', 'Book Appointment', and 'Appointment History'. The main header displays 'USER | BOOK APPOINTMENT' and 'User / BookAppointment'. The central form is titled 'Book Appointment' and includes the following fields: 'Doctor Specialization' with a 'Select Specialization' dropdown, 'Doctors' with a 'Select Doctor' dropdown, 'Consultancy Fees' with a text input field, 'Date' with a 'dd----yyyy' format and a calendar icon, and 'Time' with a '--:-- --' format and a clock icon. A 'Submit' button is located at the bottom of the form.

## Doctor's Dashboard:

The screenshot displays the 'DOCTOR | DASHBOARD' page. The top left shows 'HMS' and a hamburger menu icon. The top right features 'Hospital Management System' and a user profile dropdown menu with options: 'My Profile', 'Change Password', and 'Log Out'. The sidebar on the left has 'MAIN NAVIGATION' with 'Dashboard' and 'Appointment History'. The main content area contains two large cards: 'My Profile' with a smiley face icon and a link to 'Update Profile', and 'My Appointments' with a calendar icon and a link to 'View Appointment History'. The bottom of the page is a large, empty light gray area.



## Doctor's Profile

Hospital Management System

MAIN NAVIGATION

- Dashboard
- Appointment History

### Edit Doctor

Doctor Specialization: Demo test

Doctor Name: abc

Doctor Clinic Address: xyz

Doctor Consultancy Fees: 200

Doctor Contact no: 852888888

Doctor Email: test@demo.com

## Appointments:

HMS Hospital Management System

MAIN NAVIGATION

- Dashboard
- Appointment History

### DOCTOR | APPOINTMENT HISTORY

Doctor / Appointment History

#	Patient Name	Specialization	Consultancy Fee	Appointment Date / Time	Appointment Creation Date	Current Status	Action
---	--------------	----------------	-----------------	-------------------------	---------------------------	----------------	--------

# Admin

The screenshot shows the Admin Dashboard of the Patients Medical Record Management System. The page title is "ADMIN | DASHBOARD". The breadcrumb trail is "Admin / Dashboard". The main navigation menu on the left includes: Dashboard, Doctors (with sub-items: Doctor Specialization, Add Doctor, Manage Doctors), Patients, Appointment History, Doctor Session Logs, and User Session Logs. The dashboard features three summary cards: "Manage Patients" with "Total Patients :6", "Manage Doctors" with "Total Doctors :7", and "Appointments" with "Total Appointments :2".

## Admin Manage Doctors:

The screenshot shows the Admin Manage Doctors page of the Patients Medical Record Management System. The page title is "ADMIN | MANAGE DOCTORS". The breadcrumb trail is "Admin / Manage Doctors". The main navigation menu on the left is the same as in the dashboard. The "Manage Doctors" section includes a "data deleted !!" message and a table with the following data:

#	Specialization	Doctor Name	Creation Date	Action
1.	Dentist	Musa	2016-12-29 07:25:37	<a href="#">✎</a> <a href="#">✕</a>
2.	Homeopath	Steven	2016-12-29 07:51:51	<a href="#">✎</a> <a href="#">✕</a>
3.	General Physician	Daniel	2017-01-07 08:43:35	<a href="#">✎</a> <a href="#">✕</a>
4.	Demo test	abc	2017-01-07 09:08:58	<a href="#">✎</a> <a href="#">✕</a>

## **4.5 SYSTEM REQUIREMENTS**

The system's physical and non-physical components are widely divided into hardware and software needs.

## **4.6 SOFTWARE DEPLOYMENT AND INSTALLATION**

To start this program, you need install Wamp Server on your computer system. The compact disk (CD) or flash drive should be transferred to the program. The software flash or compact disk should be placed into the computer system with which the vote is loaded. And the following process is performed to install the application:

- i. Open the inserted CD or flash drive containing the software
- ii. Go to the root folder of the Wamp server named “www” and open the folder
- iii. Copy the application from the CD or Flash drive into the opened folder

To start the XAMPP server, click the Taskbar icon. Click on PHPmyadmin to do so

You navigate to the PHPmyadmin page of your browser. Create a database "cafeteria" which shows the database created. Click the Import button to import a database in the application folder. You launch your program using the web browser URL (<http://localhost/cafteria>).

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATION**

#### **5.1 SUMMARY OF RESEARCH FINDINGS**

Technological advances have led to the employment of a computer system to address real issues in many areas of work. This progress has led to system process automation. This study investigated manual health information processing to create a 'Automatic Health Information System.' This system facilitates computing patient information, reliable storage of data, easy access and information retrieval for authorized users, as well as provides a high degree of safety for patient records. The program includes the capabilities to adequately record the medical history of a patient. In addition, there is a provision for the search and examination of reports of present and discharged patients. The patient health information system is safer, more adaptable, offers user feedback, lowers workloads, avoids wrong data and provides more functionality compared to the existing system.

#### **5.2 RESEARCH CONCLUSION**

The widespread use of electronic medical records software in the Nigerian health care system is likely to dramatically alter the nature of the interaction between patients and physicians. In this age of electronic medicine patients and healthcare professionals have begun to face new difficulties, and they have also begun to draw significant benefits from improving health information technology. The breadth and depth of the usage of the Electronic Health System will only grow, since public law demands that all providers of health care utilize the Electronic Health System. In addition, to ensure that the greatest beneficial results are achieved, both health professionals and patients must be aware of the major problems involved with using an electronic health system. In the previous chapters I addressed some of the most important

problems with adoption of the Electronic Health System vs. paper record use. The research explicitly described the impact of these questions on the connection and quality of treatment between the patient and the doctor. Analysis was done from the healthcare provider's viewpoint and the patient's standpoint.

### **5.3 RECOMMENDATIONS**

This new system has been successfully tested, installed and fulfills all the criteria stated. Unlike the current manual method, the new system is more secure, adaptable, offers more user feedback, lowers effort, avoids wrong data input and provides additional capabilities. This software should not only be used to decrease the burden of the Electronic Health Information System but also to promote the continuity and improvement of record-keeping. The following were also suggested.

- i. This system must not be used for any illegal or unauthorized purpose since it remains a prototype and if not utilized by a professional it will be susceptible to error.
- ii. Finally, all the operators who want to use this system must know how to operate the system and have had a brief instruction on how to prevent mistakes.

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## APPENDIX

```
<!DOCTYPE HTML>

<html>

  <head>

    <title>Secured Patients Biometrics Health M.S</title>

    <link href="css/style.css" rel="stylesheet" type="text/css" media="all" />

    <link href='http://fonts.googleapis.com/css?family=Ropa+Sans'
rel='stylesheet' type='text/css'>

    <link rel="stylesheet" href="css/responsiveslides.css">

    <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.8.3/jquery.min.js"></script>

    <script src="js/responsiveslides.min.js"></script>

    <script>

      // You can also use "$(window).load(function() {"

        $(function () {

          // Slideshow 1

          $("#slider1").responsiveSlides({

            maxwidth: 1600,

            speed: 600

          });

        });

    </script>

  </head>
```

```

<body>
  <!--start-wrap-->

  <!--start-header-->
  <div class="header">
    <div class="wrap">
      <!--start-logo-->
      <div class="logo">
        <a href="index.html" style="font-size: 30px;">Web
Based Patient Medical Record System</a>
      </div>
      <!--end-logo-->
      <!--start-top-nav-->
      <div class="top-nav">
        <ul>
          <li class="active"><a
href="index.html">Home</a></li>

          <li><a href="contact.php">contact</a></li>
        </ul>
      </div>
      <div class="clear"> </div>
      <!--end-top-nav-->
    </div>
  <!--end-header-->

```



```

</div>

<div class="clear"> </div>

  <!--start-image-slider---->

      <div class="image-slider">

          <!-- Slideshow 1 -->

          <ul class="rslides" id="slider1">

              <li></li>

              <li></li>

              <li></li>

          </ul>

          <!-- Slideshow 2 -->

      </div>

  <!--End-image-slider---->

<div class="clear"> </div>

<div class="content-grids">

  <div class="wrap">

    <div class="section group">

      <div class="listview_1_of_3 images_1_of_3">

        <div class="listimg listimg_1_of_2">

```

</div>

<div class="text list\_1\_of\_2">

<h3>Patients</h3>

<p>Register & Book Appointment</p>

<div class="button"><span><a

href="hms/user-login.php">Click Here</a></span></div>

</div>

</div>

<div class="listview\_1\_of\_3 images\_1\_of\_3">

<div class="listing listing\_1\_of\_2">



</div>

<div class="text list\_1\_of\_2">

<h3>Doctors Login</h3>

<div class="button"><span><a

href="hms/doctor/">Click Here</a></span></div>

</div>

</div>

<div class="listview\_1\_of\_3 images\_1\_of\_3">

<div class="listing listing\_1\_of\_2">



</div>

<div class="text list\_1\_of\_2">

<h3>Admin Login</h3>

<div class="button"><span><a

href="hms/admin">Click Here</a></span></div>

</div>

</div>

</div>

</div>

</div>

<div class="wrap">

<div class="content-box">

<div class="section group">

<div class="col\_1\_of\_3 span\_1\_of\_3 frist">

</div>

<div class="col\_1\_of\_3 span\_1\_of\_3 second">

</div>

<div class="col\_1\_of\_3 span\_1\_of\_3 frist">

</div>

</div>

```

        </div>
    </div>
    <div class="clear"> </div>
    <div class="footer">
        <div class="wrap">
            <div class="footer-left">
                <ul>
                    <li><a href="index.html">Home</a></li>
                    <li><a href="contact.php">contact</a></li>
                </ul>
            </div>
        </div>
        <div class="clear"> </div>
    </div>
</div>
<!--end-wrap-->
</body>
</html>
<?php
include_once('include/config.php');
if(isset($_POST['submit']))
{
$name=$_POST['full_name'];
$address=$_POST['address'];
$city=$_POST['city'];

```

```
$gender=$_POST['gender'];
$email=$_POST['email'];
$password=md5($_POST['password']);
$query=mysql_query("insert into users(fullname,address,city,gender,email,password)
values('$fname','$address','$city','$gender','$email','$password')");
if($query)
{
    echo "<script>alert('Successfully Registered. You can login now');</script>";
    //header('location:user-login.php');
}
}
?>
```

```
<!DOCTYPE html>
```

```
<html lang="en">
```

```
<head>
```

```
<title>Secured Patients Biometrics Health M.S</title>
```

```
<meta charset="utf-8" />
```

```
<meta name="viewport" content="width=device-width, initial-scale=1.0, user-
scalable=0, minimum-scale=1.0, maximum-scale=1.0">
```

```
<meta name="apple-mobile-web-app-capable" content="yes">
```

```
<meta name="apple-mobile-web-app-status-bar-style" content="black">
```

```
<meta content="" name="description" />
```

```
<meta content="" name="author" />

<link
href="http://fonts.googleapis.com/css?family=Lato:300,400,400italic,600,700|Raleway:300,4
00,500,600,700|Crete+Round:400italic" rel="stylesheet" type="text/css" />

<link rel="stylesheet" href="vendor/bootstrap/css/bootstrap.min.css">

<link rel="stylesheet" href="vendor/fontawesome/css/font-
awesome.min.css">

<link rel="stylesheet" href="vendor/themify-icons/themify-icons.min.css">

<link href="vendor/animate.css/animate.min.css" rel="stylesheet"
media="screen">

<link href="vendor/perfect-scrollbar/perfect-scrollbar.min.css"
rel="stylesheet" media="screen">

<link href="vendor/switchery/switchery.min.css" rel="stylesheet"
media="screen">

<link rel="stylesheet" href="assets/css/styles.css">

<link rel="stylesheet" href="assets/css/plugins.css">

<link rel="stylesheet" href="assets/css/themes/theme-1.css" id="skin_color"
/>
```

```
</head>
```

```
<body class="login">
```

```

<!-- start: REGISTRATION -->

<div class="row">

    <div class="main-login col-xs-10 col-xs-offset-1 col-sm-8 col-sm-
offset-2 col-md-4 col-md-offset-4">

        <div class="logo margin-top-30">

            <h2>Patient Registration</h2>

        </div>

        <!-- start: REGISTER BOX -->

        <div class="box-register">

            <form name="registration" id="registration"
method="post">

```

```

                <fieldset>

                    <legend>

                        Sign Up

                    </legend>

                    <p>

                        Enter your personal details

                    </p>

                    <div class="form-group">

                        <input type="text" class="form-
control" name="full_name" placeholder="Full Name" required>

                    </div>

                    <div class="form-group">

```

```
        <input type="text" class="form-
control" name="address" placeholder="Address" required>
```

```
</div>
```

```
<div class="form-group">
```

```
        <input type="text" class="form-
control" name="city" placeholder="City" required>
```

```
</div>
```

```
<div class="form-group">
```

```
    <label class="block">
```

```
        Gender
```

```
    </label>
```

```
    <div class="clip-radio radio-
primary">
```

```
        <input type="radio"
id="rg-female" name="gender" value="female" >
```

```
        <label for="rg-female">
```

```
            Female
```

```
        </label>
```

```
        <input type="radio"
id="rg-male" name="gender" value="male">
```

```
        <label for="rg-male">
```

```
            Male
```

```
        </label>
```

```
    </div>
```

```
</div>
```



```
<p>
```

Enter your account details below:

```
</p>
```

```
<div class="form-group">
```

```
<span class="input-icon">
```

```
<input type="email"
```

```
class="form-control" name="email" id="email" onBlur="userAvailability()"
```

```
placeholder="Email" required>
```

```
<i class="fa fa-
```

```
envelope"></i> </span>
```

```
<span id="user-
```

```
availability-status1" style="font-size:12px;"></span>
```

```
</div>
```

```
<div class="form-group">
```

```
<span class="input-icon">
```

```
<input type="password"
```

```
class="form-control" id="password" name="password" placeholder="Password" required>
```

```
<i class="fa fa-lock"></i>
```

```
</span>
```

```
</div>
```

```
<div class="form-group">
```

```
<span class="input-icon">
```

```
<input type="password"
```

```
class="form-control" name="password_again" placeholder="Password Again" required>
```

```
<i class="fa fa-lock"></i>
```

```
</span>
```

```
</div>
```

```
<div class="form-group"> <p>Register Fingerprint Biometrics Here! </p>
```

```
<span class="input-icon">
```

```

```

```
<i class="fa fa-lock"></i>
```

```
</span>
```

```
</div>
```

```
<div class="form-group">
```

```
<div class="checkbox clip-check
```

```
check-primary">
```

```

id="agree" value="agree">
    <input type="checkbox"
    <label for="agree">
        I agree
    </label>
</div>
</div>
<div class="form-actions">
    <p>
        Already have an account?
        <a href="user-
login.php">
            Log-in
        </a>
    </p>
    <button type="submit"
class="btn btn-primary pull-right" id="submit" name="submit">
        Submit <i class="fa fa-
arrow-circle-right"></i>
    </button>
</div>
</fieldset>
</form>

<div class="copyright">

```

&copy; <span class="current-year"></span><span class="text-bold text-uppercase"> HMS</span>. <span>All rights reserved</span>

</div>

</div>

</div>

</div>

<script src="vendor/jquery/jquery.min.js"></script>

<script src="vendor/bootstrap/js/bootstrap.min.js"></script>

<script src="vendor/modernizr/modernizr.js"></script>

<script src="vendor/jquery-cookie/jquery.cookie.js"></script>

<script src="vendor/perfect-scrollbar/perfect-scrollbar.min.js"></script>

<script src="vendor/switchery/switchery.min.js"></script>

<script src="vendor/jquery-validation/jquery.validate.min.js"></script>

<script src="assets/js/main.js"></script>

<script src="assets/js/login.js"></script>

<script>

jQuery(document).ready(function() {

    Main.init();

    Login.init();

});

</script>

```
<script>

function userAvailability() {

$("#loaderIcon").show();

jQuery.ajax({

url: "check_availability.php",

data:'email='+$("#email").val(),

type: "POST",

success:function(data){

$("#user-availability-status1").html(data);

$("#loaderIcon").hide();

},

error:function (){}

});

}

</script>
```

```
</body>
```

```
<!-- end: BODY -->
```

```
</html>
```