International Journal of Trend in Scientific Research and Development (IJTSRD)
Special Issue on Innovations in Computer Science and Applications
Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

A Secure and Efficient Medical Card Generation System for Healthcare Management

Gaurav Wadibhasme

Department of Science and Technology,
G. H. Raisoni Skill Tech University, Nagpur, Maharashtra, India

Abstract

Healthcare institutions in India still rely heavily on manual, paper-based records for managing basic patient details such as identity information, blood group, and medical consultations, which leads to delayed retrieval of data, frequent loss or damage of records, and inconsistencies across registers. To address these practical issues at an institutional scale, this project implements a web-based Medical Card Generation System that digitally stores and manages medical card records for patients. The system is developed using HTML, CSS, JavaScript, PHP, and MySQL deployed on an Apache web server, and provides role-based interfaces for administrators and users. Administrators can create, update, search, and report on medical cards through a dashboard, while users can view and print their medical cards using a unique reference number.

The paper presents the motivation and problem statement, reviews related web-based hospital and medical record management systems, and then explains the proposed system architecture, core modules, and database design in detail. The implementation section describes the development environment, key forms such as the Add Medical Card screen, and the procedures followed for testing the application. Results show that the developed prototype successfully replaces manual registers with a centralized database, supports fast retrieval of records, and provides basic reporting capabilities suitable for small and medium healthcare institutions. Finally, the paper discusses limitations and outlines future enhancements such as SMS/email notifications, analytics dashboards, and cloud deployment.

KEYWORDS: *Medical card; Web-based application; PHP; MySQL; Electronic medical record; Hospital information system; Digital health.*

1. Introduction

Managing basic patient information through paper-based medical cards is still common in many local clinics and institutional health centres, where staff rely on physical registers or handwritten cards stored in files and cupboards. Over time, such records become difficult to search, prone to physical damage, and inconsistent across departments, which directly affects the quality and speed of patient service. A small error in recording blood group or consultation notes can lead to serious medical risks, while the time required to locate an old card increases waiting time for patients.[1][4]

With the rapid growth of web technologies, even small institutions can now afford browser-based information systems running on low-cost hardware using open-source software stacks such as PHP, MySQL, and Apache. Web-based health record applications provide a unified platform where patient details are entered once and then reused for multiple purposes such as verification, reporting, and printing summaries. This project adopts that idea and focuses specifically on the generation and management of institutional medical cards rather than full electronic health records.[2][5][3]

The Medical Card Generation System is designed as a simple but complete web application that allows administrators to create and manage digital medical cards and enables end users to view and print them. The intention is to build a realistic academic project that resembles how small hospitals or college health centres could gradually move from registers to online systems without very high infrastructure costs.[1]

1.1. Motivation

During routine observation of existing practices, it was noted that medical cards and student health records were maintained manually in paper files, leading to problems such as loss or damage of documents, redundancy when duplicate cards were created, and difficulty in generating any summary report. Staff members needed to go through multiple registers to answer a single enquiry, and there was no quick way to know how many cards were issued in a specific period or to search by reference number.[1]

Literature on patient information management systems and web-based hospital management solutions highlights similar challenges in traditional systems, including poor accessibility, data redundancy, and limited support for decision-making. Modern hospital information systems and electronic health record projects aim to overcome these limitations through centralized databases, role-based access, and intuitive user interfaces, but many of these solutions are heavy and targeted at large hospitals.[6][7][3][8][9]

The motivation of this project is therefore to design a comparatively lightweight and focused system that mainly handles medical card details while still following good design practices such as secure storage, modular architecture, and simple reporting. Another motivation was to gain hands-on experience with building a complete PHP–MySQL application, from requirement analysis and database design to coding, testing, and deployment on a local web server.[4][1]

1.2. Contribution

The specific contributions of this project can be summarized as follows:[1]

- Design and implementation of a web-based Medical Card Generation System that replaces manual card registers using a MySQL relational database.
- Separation of roles into an admin module and a user module, with different interfaces for managing cards, content pages, enquiries, and search/report operations.[1]
- Implementation of core features such as digital card creation, unique reference number generation, secure storage of demographic and basic medical information, and quick retrieval through a search form.
- Integration of printable medical card views so that staff can still produce a physical card whenever needed without manually rewriting information.
- Preparation of a working prototype that can serve as a starting point for further enhancements like cloud deployment, analytics dashboards, and mobile apps.[10][1]

Related Work

Research on web-based hospital management systems consistently shows that digitizing patient records improves operational efficiency, reduces data redundancy, and enhances accessibility of information across departments. A PHP and MySQL-powered hospital management system developed in recent work demonstrates how open-source stacks can handle core operations such as patient registration, appointment scheduling, billing, and inventory management on a single platform. Similar projects point out that centralized databases and role-based access control are essential to ensure data consistency and privacy.[2][6]

Several studies specifically analyze electronic medical record (EMR) or electronic patient record (EPR) systems delivered via the web. For example, a web-based EPR system was developed to display DICOM images, structured reports, and therapy records using a mix of client–server and browser–server architectures, highlighting the importance of efficient data delivery and visualization in collaborative medical environments. Another study describes the design of an electronic medical record exchange system that uses standardized formats and RESTful APIs to allow institutions to share patient data securely.[5][11]

Closer to the scope of this project, multiple authors have proposed web-based health centre or hospital maintenance systems using PHP with MySQL and XAMPP. These systems typically manage patient profiles, doctor information, inventory, laboratory reports, and billing, and emphasize the benefits of centralized medical records over manual files. A website-based medical record system using PHP and MySQL shows how various interfaces—such as login pages, admin dashboards, and patient views—can support interaction between doctors, staff, and patients while improving health information management.[3][4][12][13]

Beyond full hospital information systems, recent work on health cards and digital health identity also provides useful context. Smart health card solutions use mobile applications, QR codes, or NFC to store key medical details and enable interoperability between hospitals, while national digital health card initiatives seek to integrate patient identity, insurance, and electronic records. Although the present project does not implement mobile or NFC technology, it aligns with the broader direction of providing portable, easily retrievable digital health information.[14][10]

These studies collectively support the idea that even a focused medical card management system, when built on web technologies and relational databases, can significantly reduce paperwork, improve record accuracy, and create a platform for future integration with larger e-health ecosystems.[4][2][3]

Proposed System / Methodology

The proposed Medical Card Generation System is a web-based application that provides a centralized platform for creating, storing, and retrieving digital medical cards for patients or students within an institution. The system follows a traditional three-tier architecture consisting of the presentation layer (web interface), application logic layer (PHP scripts), and data layer (MySQL database), and is deployed on an Apache web server using XAMPP or WAMP on a standard desktop machine.[1][3]

3.1. Problem Statement

The existing manual system for managing medical cards suffers from several operational issues:[1]

- Paper records can be lost, damaged, or misplaced, especially when stored for many years.
- Searching for a particular card is time consuming because staff must manually browse files or registers.
- Information is often duplicated across multiple registers, resulting in redundancy and inconsistencies.
- Preparing reports, such as the number of cards issued in a month, requires manual counting.
- Enquiry management is inefficient, since there is no central place where all card-related data can be searched.[7][1]

The problem can therefore be stated as: *to design and develop a secure, web-based Medical Card Generation System that stores medical card details in a centralized database, supports efficient retrieval using a reference number, and provides basic reporting and enquiry management for small healthcare institutions*.

3.2. System Architecture

The architecture of the system follows a standard web application pattern with role-based access.

- **Client Layer:** Users (admin or general users) access the system through a web browser on a desktop or laptop. The interface is built using HTML, CSS, and JavaScript for basic interactivity.[1]
- **Application Layer:** PHP scripts handle form submissions, validate user input, implement business logic such as generating unique reference numbers, and communicate with the database using SQL queries.[2][1]
- **Data Layer:** A MySQL database stores medical card records, admin credentials, static page content, and enquiry messages. Tables are related through primary and foreign keys to maintain consistency and avoid redundancy.[3][1]

A typical workflow is as follows. An administrator logs in to the system and uses the **Add Medical Card** form to register a new patient, providing details such as full name, contact number, email address, blood group, age, gender, address,

medical conditions, and validity dates. After validation, the system inserts this data into the medical card table and generates a unique reference number that can later be used by users to view or print the card. Users visiting the public site can navigate to the medical card section, enter the reference number, and retrieve the corresponding card information.[1]

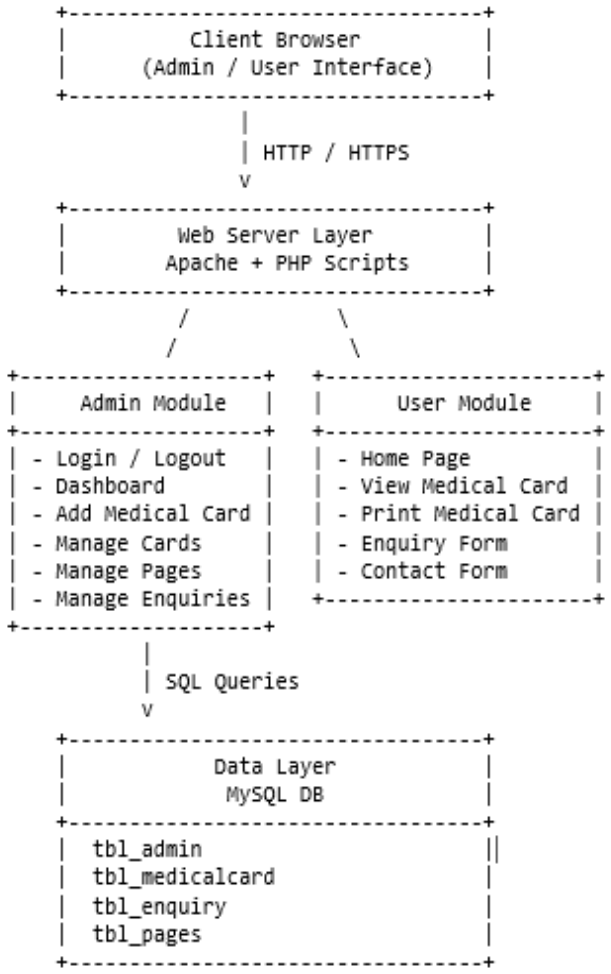

Fig. 1. Conceptual system architecture of the Medical Card Generation System.

The uploaded screenshots illustrate the actual user interfaces implemented in the project. The **Admin Dashboard** provides a summary of total medical cards created, daily and weekly statistics, and the number of read and unread enquiries, helping the administrator quickly understand system usage.

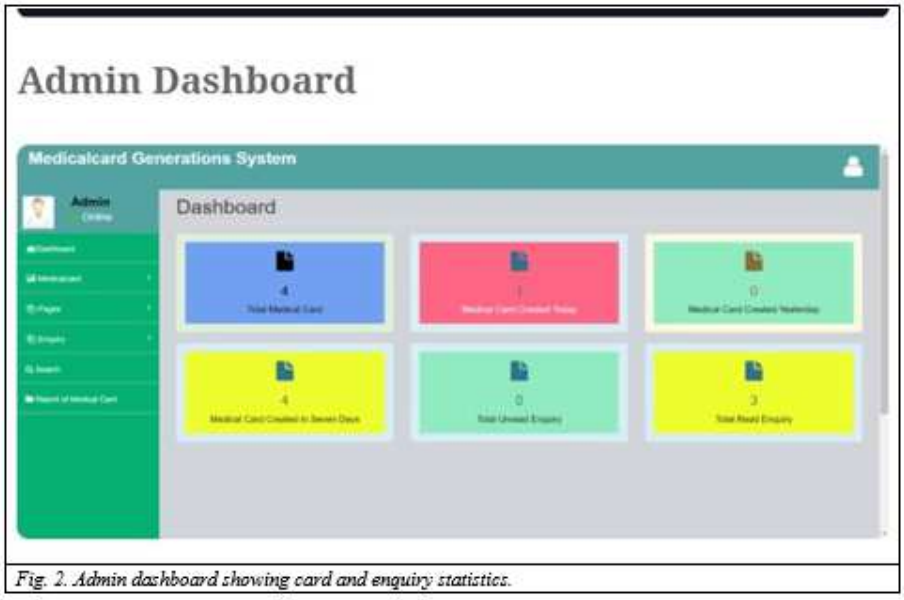

Fig. 2. Admin dashboard showing card and enquiry statistics.

Fig. 3. Manage Medical Card screen listing existing cards with actions.

Fig. 4. Public home page of the Medical Card Generation System.

3.3. Algorithm and Module Explanation

Instead of complex machine learning algorithms, this project focuses on the design of modules and database operations that together implement a reliable card management workflow. At a high level, the logic for creating and managing cards can be summarized as follows:[1]

1. **Input validation and sanitization** – When the admin submits the Add Medical Card form, server-side PHP scripts validate required fields, check email format, and sanitize inputs to avoid SQL injection and cross-site scripting (XSS).[15]
2. **Reference number generation** – The system generates a unique reference number, for example by combining a prefix with an auto-incremented identifier or timestamp, and stores it with the card record. This makes it easy for users to retrieve cards without exposing internal IDs.
3. **Database insertion and update** – Valid records are inserted into the medical card table. Update and delete operations are available from the Manage Medical Card screen using the same validation rules.
4. **Search and retrieval** – The search interface allows the admin to filter cards by reference number, name, or date range, while public users can only search using their own reference number.
5. **Enquiry handling** – Messages submitted from the contact or enquiry page are stored in an enquiry table, and the dashboard tracks the number of unread and read enquiries.
6. **Reporting** – Basic reports, such as total cards created today, yesterday, or in the last seven days, are generated using SQL aggregate queries and displayed as coloured tiles on the dashboard.[1]

Table 1 summarizes the main modules of the system and their responsibilities.

Module	Description
Admin Authentication	Handles secure login and logout for the administrator using stored credentials.
Dashboard	Displays high-level statistics on total cards created and enquiry status.
Medical Card Management	Provides forms and tables to add, edit, view, and delete medical cards.
Page Management	Allows updating of static pages such as About Us and Contact.
Enquiry Management	Stores and displays enquiries from users, marking them as read or unread.
Search and Reports	Supports searching by reference number and generating date-wise reports.
Public Medical Card View	Enables users to view and print their card using the reference number.

Table 1. Summary of core modules in the Medical Card Generation System.

Implementation / Experimental Setup

4.1. Dataset or System Data

Unlike data-driven machine learning projects, this work deals primarily with structured records representing individual medical cards. Each record contains fields such as full name, profile image path, contact number, email address, blood group, age, gender, address, medical consultation notes, issue date, and validity date. These fields were chosen based on typical information required on institutional medical cards and on examples from existing hospital management systems.[1][7][4]

For testing purposes, a sample dataset of medical cards and enquiries was created by inserting records through the application itself rather than directly in the database. This approach ensures that all validation rules and business logic are exercised during testing. The system stores data in a normalized MySQL schema, where separate tables exist for admin users, medical cards, content pages, and enquiries, connected via primary keys.[3][1]

4.2. Development Environment and Tools

The system was implemented using the following hardware and software setup:[1]

- **Hardware:** Intel i3 processor or higher, at least 4 GB RAM, and approximately 500 MB free storage for the application and database.
- **Operating System:** Windows or Linux workstation used for development and testing.
- **Server Stack:** XAMPP/WAMP distribution providing Apache web server, PHP interpreter, and MySQL database engine.[3][1]
- **Programming Languages and Technologies:** HTML and CSS for page structure and styling, JavaScript for basic client-side interactivity, PHP for server-side logic, and MySQL for persistent storage.[2][1]
- **Development Tools:** A code editor such as VS Code or Sublime Text, phpMyAdmin for database management, and a modern web browser for testing.

During development, the database schema was first designed and created in MySQL, including indexes on frequently searched columns such as reference number and creation date. The PHP application was then built module by module, starting from authentication and dashboard, followed by card management, page management, and enquiry handling. Each module was tested locally using XAMPP before being integrated into the final system.

Results and Discussion

After completing the implementation, the Medical Card Generation System was tested using a set of sample records to verify that all core use cases work as expected. Administrators were able to log in, add new medical cards with complete details, and immediately see updated statistics in the dashboard tiles showing total cards created overall, on the current day, on the previous day, and in the last seven days. The Manage Medical Card screen correctly listed existing records in a paginated table with options to view, edit, or delete individual cards, demonstrating that update and delete operations are functioning.[1]

From the user perspective, the public Home Page presents an introductory description of the system and links to view or search medical cards and to submit enquiries. When a valid reference number is entered, the system retrieves the corresponding card from the database and displays it in a printable format. This feature shows how a digital system can still support traditional physical cards while eliminating repeated handwriting and duplication.[7][1]

Qualitatively, several improvements over the manual process were observed during testing. Record retrieval became nearly instantaneous, as users only needed to enter a reference number instead of searching through physical files. The risk of losing records decreased because all information is stored in a database that can be backed up regularly. At the same time, the use of server-side validation reduced the chances of incomplete or inconsistent entries, helping to maintain better data quality than handwritten registers.[4][12]

The project also highlighted some practical considerations. For instance, performance on low-end hardware was acceptable for small datasets, but scaling to thousands of records would require optimized queries and possibly indexing or archival strategies. Additionally, although the system provides basic role separation, more advanced security measures such as encrypted connections (HTTPS), password hashing, and detailed access control lists would be needed in a production healthcare environment to comply with privacy regulations.[3][9]

Conclusion and Future Work

This work presented the design and implementation of a Medical Card Generation System that digitizes the creation and management of institutional medical cards using a PHP–MySQL web application. By replacing paper-based registers with a centralized database and intuitive web interfaces, the system addresses key issues of data loss, slow retrieval, and poor report generation found in manual processes. The developed prototype demonstrates that even with modest hardware and open-source tools, small healthcare units can significantly improve the reliability and accessibility of basic patient records.[1]

Several limitations remain. The current version focuses mainly on demographic details and simple consultation notes and does notyet integrate laboratory reports, prescriptions, or detailed clinical histories. Security is handled at a basic level, without full encryption or integration with hospital identity management systems. Furthermore, the system currently runs on a local server and has not been deployed in a real healthcare setting.

Future enhancements could include the following directions:[14][10][1]

- Development of mobile applications for Android or iOS to allow staff and patients to access medical cards on the go.
- Integration of SMS and email notifications to send card creation confirmations, reminders for validity expiry, or important health messages.
- Extension of the database to store additional clinical information and to support analytics dashboards for administrators.
- Migration to a cloud-based infrastructure to improve scalability, availability, and data backup.
- Implementation of stronger security mechanisms such as HTTPS, password hashing, role-based access control,

and audit logs to meet healthcare privacy standards.[3][9]

Overall, the project demonstrates a feasible path for institutions currently using manual medical cards to transition towards digital health record management in incremental steps.

References

[1] C. Y. Chen et al., "Web-based electronic patient records for collaborative medical applications," *BMC Medical Informatics and Decision Making*, 4(8), 2004.

[2] S. Goyal and M. V. Thomas, "Cloud Computing Based Electronic Health Record System for Efficient Medical Services," *International Journal of Modern Science and Engineering*, vol. 8, no. 2, pp. 23–31, 2017

[3] C. C. Mohan et al., "E-Health Centre Maintenance System using PHP with MySQL and XAMPP Web Server," *International Journal of Advanced Research in Science, Communication and Technology*, vol. 3, no. 1, pp. 100–107, 2022

[4] P. Singh and R. Sharma, "Hospital Management System – A Smart and User-Centric Web-Based Solution," *International Journal of Applied Engineering and Management*, vol. 9, no. 2, pp. 45–51, 2023

[5] A. Kumar and S. Verma, "A PHP and MySQL-Powered Hospital Management System," *International Journal for Multidisciplinary Research*, vol. 7, no. 1, pp. 120–128, 2025

[6] J. K. C. N. Jayasiri et al., "Design and Implementation of an Automated Hospital Management System with MERN Stack," *International Journal of Engineering and Management Research*, vol. 12, no. 5, pp. 197–202, 2022

[7] S. Patil and A. Deshmukh, "Smart Health Card Using Android Technology," *International Journal of Scientific Development and Research*, vol. 10, no. 1, pp. 1–6, 2025

[8] V. Gupta, "Transforming Digital Health Card Healthcare in India," *STM Journals in Computers & Information Technology*, vol. 10, no. 2, pp. 15–25, 2025

[9] I. Maulana, "Sistem Rekam Medis Menggunakan PHP dan MySQL Berbasis Website," *Jurnal Rekayasa Teknologi Nusa Putra*, vol. 9, no. 2, pp. 114–121, 2023

[10] L. Tran, "Patient Information Management System in Digital Healthcare," *Luvina Research Whitepaper*, 2024

[11] R. K. Sharma et al., "Web-Based Hospital Management System Using PHP and MySQL," *International Journal of Advanced Research in Science, Communication and Technology*, vol. 4, no. 3, pp. 210–217, 2023

[12] "Create a Hospital Management System using PHP and MySQL," GeeksforGeeks, 2024