

Project 1

Smart Health Information System

Bachelor Of Computer Application

By

Arpan Dasgupta (Roll no. : 220755207992)

Shubham Kumar (Roll no. : 220755206840)

Ayush Chaurasiya (Roll no. : 220755205040)

Adarsh Patwa (Roll no. : 220755208002)



Annex College Of Management Studies

(Centre For Technical & Management Studies)

(July 2024)

CERTIFICATE

It is certified that the work contained in the project report titled “Smart Health Information System,” by “Arpan Das Gupta, Shubham Kumar, Ayush Chaurasiya and Adarsh Patwa” have been carried out under my/our supervision and that this work has not been submitted elsewhere for a degree.

Signature of Supervisor(s)

Atikul Islam

CSE

Annex College Of Management Studies

July 2024

Declaration

I/We declare that this written submission represents my/our ideas in my/our own words and where others' ideas or words have been included, I /We have adequately cited and referenced the original sources. I/We also declare that I/We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I/We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Arpan Dasgupta

Roll No: **220755207992**

Date: _____

Shubham Kumar

Roll No: **220755206840**

Date: _____

Ayush Chaurasiya

Roll No: **220755205040**

Date: _____

Adarsh Patwa

Roll No: **220755208002**

Date: _____

Approval Sheet

This project report entitled (Smart Health Information System) by (Alex Johnson) is approved for the project 1.

Examiners

Supervisor (s)

ACADEMIC HEAD

Poushali Kundu

PRINCIPAL

Date : _____

Place:

ACKNOWLEDGEMENT

It gives us great pleasure to find an opportunity to express our deep and sincere gratitude to our project guide Atikul Islam. We do very respectfully recollect his constant encouragement, kind attention and keen interest throughout the course of our work. We are highly indebted to him for the way he modelled and structured our work with his valuable tips and suggestions that he accorded to us in every aspect of our work.

We are extremely grateful to the Department of Computer Science & Engineering, for extending all the facilities of our department.

We humbly extend our sense of gratitude to other faculty members, laboratory staff, library staff and administration of this Institute for providing us their valuable help and time with a congenial working environment.

Last but not the least; we would like to convey our heartiest thanks to all our classmates who time to time have helped us with their valuable suggestions during our project work.

Date:

NAME: **Arpan Dasgupta**
UNIVERSITY ROLL NO: **220755207992**

NAME: **Shubham Kumar**
UNIVERSITY ROLL NO: **220755206840**

NAME: **Ayush Chaurasiya**
UNIVERSITY ROLL NO: **220755205040**

NAME: **Adarsh Patwa**
UNIVERSITY ROLL NO: **220755208002**

ABSTRACT

The Smart Health Information System (SHIS) project introduces a transformative approach to healthcare management and patient care using advanced information technologies. This system aims to streamline healthcare operations and enhance patient outcomes through innovative solutions.

Key features of SHIS include real-time patient monitoring, centralized electronic health records (EHRs), and a robust communication platform for healthcare professionals. These components are designed to improve efficiency, accuracy, and accessibility in healthcare delivery.

Emphasizing data security and regulatory compliance, SHIS ensures patient confidentiality and safe information management. Collaboration among healthcare stakeholders and system developers drives continuous improvement and adaptation to evolving healthcare needs.

In conclusion, SHIS represents a significant advancement in healthcare information systems, promising enhanced efficiency and effectiveness in healthcare services delivery.

CONTENT

1. Introduction	1
1.1. Problem Statement	1
1.2. Domain Study.....	1
1.3. Existing System	2
1.4. Project Scope	2
2. System Requirements	3
2.1. Literature Survey.....	3
2.2. Functional Specification.....	3
2.3. Non-Functional Specification.....	4
2.4. Hardware Requirements.....	4
2.5. Software Requirements	4
3. Design Specification.....	5
3.1 Modular Design.....	5
3.1.1.1. Data Flow Diagram	6
4. Web View	7
5. Conclusion.....	12
6. References	12

1. INTRODUCTION

1.1. Problem Statement

Healthcare systems today face numerous challenges, including inefficiencies in managing patient data, fragmented information across different departments, and difficulties in maintaining up-to-date records. These issues result in delays, errors, and increased costs, ultimately affecting patient care quality. The objective of this project is to develop a Smart Healthcare Information System that integrates various healthcare processes into a cohesive, efficient, and user-friendly platform, addressing these prevalent issues.

Key Problem Areas:

- ✦ **Accessibility Issues:** Existing healthcare information systems often have complex and non-intuitive user interfaces, making it difficult for healthcare professionals to navigate and use efficiently without extensive training. Not all systems are designed to be accessible to users with disabilities, which can hinder the ability of all healthcare providers and patients to use these systems effectively.
- ✦ **Scalability Issues:** As the volume of patient data grows, existing systems struggle to scale efficiently. This can lead to slower performance and increased maintenance costs. Many healthcare providers, especially smaller clinics and rural hospitals, lack the resources to implement and maintain large-scale information systems.
- ✦ **Inefficiency and Inconvenience:** Many healthcare facilities still rely on manual data entry and paper records, which are prone to errors, time-consuming, and inefficient. This slows down the process of retrieving and updating patient information.
- ✦ **Lack of Integration:** Healthcare data is often spread across various systems and departments, leading to fragmented information. This lack of integration makes it difficult for healthcare providers to access comprehensive patient records quickly.
- ✦ **Security and Privacy Concerns:** The increasing volume of digital health data makes it a lucrative target for cyberattacks. Ensuring data security and patient privacy is a significant challenge, with numerous high-profile breaches highlighting vulnerabilities. Healthcare providers must comply with stringent regulations such as HIPAA (Health Insurance Portability and Accountability Act). Maintaining compliance requires robust data protection measures and regular audits, which can be resource-intensive.

1.2. Domain Study

The healthcare industry is a complex ecosystem involving multiple stakeholders, including hospitals, clinics, healthcare providers, patients, and insurers. Effective healthcare delivery depends on seamless communication and coordination among these entities. Recent technological advancements, such as telemedicine, wearable health devices, and AI-driven diagnostics, have shown potential in improving healthcare services. However, integrating these technologies into a unified system remains a significant challenge.

1.3. Existing Systems

Current healthcare information systems are often fragmented, with different departments using disparate platforms that lack interoperability. This disjointed approach leads to significant inefficiencies, such as duplicate data entries and delayed information retrieval. Additionally, many existing systems are plagued by outdated interfaces that require extensive training, limiting their usability. Security vulnerabilities in these systems also pose a considerable risk, as evidenced by frequent data breaches that compromise patient privacy. Consequently, there is a pressing need for a unified, user-friendly, and secure healthcare information system that can seamlessly integrate various functionalities.

1.4. Project Scope

The Scope of our project includes:

- Develop a unified system that integrates various healthcare functions such as patient management, appointment scheduling, billing, and reporting. This integration aims to streamline operations and improve efficiency across healthcare facilities.
- Implement robust data management practices to ensure accurate, consistent, and real-time availability of patient information. The system will be designed to provide easy access to data for healthcare providers, facilitating better decision-making and patient care.
- Design an intuitive, user-friendly interface that minimizes the need for extensive training. The system will be accessible across multiple devices, including desktops, tablets, and smartphones, ensuring usability for all healthcare providers and patients.
- Ensure the system complies with healthcare regulations such as HIPAA to protect patient data. Incorporate advanced security measures, including encryption and multi-factor authentication, to safeguard against data breaches and unauthorized access.
- Develop a scalable system that can handle increasing volumes of data and users. The system should be adaptable to future technological advancements and capable of integrating new functionalities as needed to meet evolving healthcare demands.
- Implement real-time data synchronization to ensure that patient information is always up-to-date across all platforms. Provide robust mobile access to allow healthcare providers to access critical information on-the-go, enhancing flexibility and responsiveness in patient care.

2. System Requirements

2.1. Literature Survey

A literature survey involves reviewing existing research and publications related to healthcare information systems. Key topics include EHR systems, health information exchanges (HIE), telemedicine, wearable health devices, and data security in healthcare. The survey helps identify best practices, technological trends, and potential challenges in developing a smart healthcare information system.

A comprehensive review of existing research reveals that successful healthcare information systems share common traits, including user-centered design, robust data security measures, and efficient data management capabilities. Technological advancements such as blockchain for secure data exchange and AI for predictive analytics are promising but underutilized in current systems. This project aims to integrate these advancements to enhance system functionality and security.

2.2. Functional Specification

✚ Patient Registration And Management

- **Registration Process:** Secure onboarding process where patients provide personal and medical information.
- **Profile Management:** Patients and healthcare providers can update personal and medical information. Unique identifiers for patients to avoid duplication and ensure accurate record-keeping.

✚ Electronic Health Records (EHR) Management

- **Data Entry:** Input of patient medical history, diagnoses, treatments, and medications. Easy access to patient records by authorized healthcare providers. Continuous updating of records with new medical information.

✚ Appointment Scheduling

- **Scheduling Interface and Automated Reminders:** Easy-to-use interface for booking appointments. Syncing with personal and provider calendars. SMS, email, or app notifications for upcoming appointments.

✚ Data Analytics and Report

- Real-time dashboard for viewing key health metrics and statistics.
- Generation of customized reports for patients and providers.

✚ Secure Data Sharing

- **Access Control:** Role-based access control to ensure only authorized personnel can access sensitive data.
- **Audit Trails:** Logging of all data access and modifications for security and compliance purposes.
- **Encryption:** End-to-end encryption of data during storage and transmission.

2.3. Non-Functional Specification

✦ Scalability

- **Horizontal and Vertical Scaling:** System can be expanded by adding more servers or upgrading existing hardware.
- **Load Balancing:** Distributing user requests across multiple servers to ensure smooth operation under high loads.

✦ Reliability

- **High Availability:** System designed to be operational 99.9% of the time.
- **Backup and Recovery:** Regular backups and a disaster recovery plan to prevent data loss.

✦ Usability

- **User-Centric Design:** Intuitive and accessible interfaces for all user types
- **Accessibility Features:** Support for users with disabilities, including screen readers and high-contrast modes.
- **User Feedback Loop:** Mechanisms for users to provide feedback and suggestions for system improvements.

✦ Security

- **Data Protection:** Implementation of advanced encryption protocols for data security.
- **Compliance:** Adherence to healthcare regulations such as HIPAA and GDPR.
- **Regular Security Audits:** Periodic security assessments to identify and mitigate vulnerabilities.

✦ Performance Efficiency

- **Response Time:** Fast loading times and quick response to user actions.
- **Efficiency:** Optimized code and efficient database queries to minimize resource usage.

2.4. Hardware Requirements

- ✦ Processor: Intel Pentium IV 2.0 GHz and above.
- ✦ RAM: 512 MB and above.
- ✦ Hard disk: 4GB and above.

2.5. Software Requirements

✦ Frontend development:

- HTML5 (Version 2.0.10)
- CSS3 (Version 2.0.10)

3. Design Specification

3.1. Modular Design

The Smart Health Information System (SHIS) is architected with a modular design approach. This design philosophy ensures that each component or module of the system can be developed, tested, and maintained independently. The modular design improves the system's flexibility, making it easier to update, scale, and integrate with other systems. Below are detailed descriptions of the key modules within the SHIS:

✚ User Interface Module

This module provides the front-end interfaces for the system, ensuring a seamless user experience.

- Displays an overview of the platform, featured listings, and navigation links.
- Responsive design for accessibility across various devices, including desktops, tablets, and smartphones.
- Intuitive navigation and user-friendly interfaces for patients, providers, and administrators.

✚ User Management Module

This module is responsible for managing user accounts and profiles, including patients, healthcare providers, and administrators.

- Registration System: Manages user sign-up with validation and email verification.
- Authentication System: Handles user login, logout, and session management
- Authorization System: Manages user roles and permissions

✚ Appointment Scheduling Module

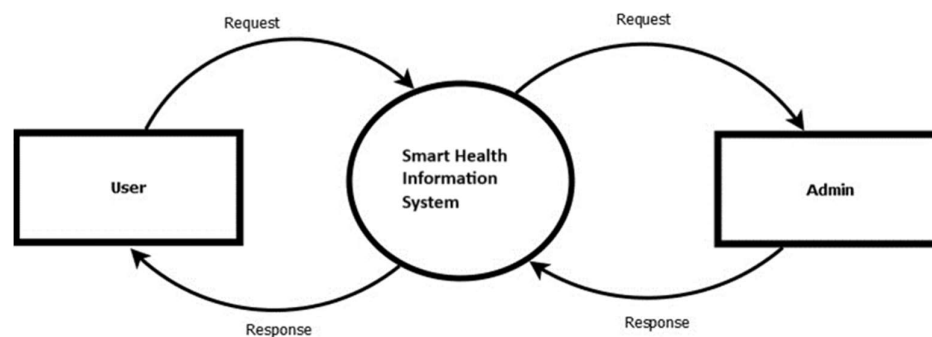
- Allow user to schedule appointment
- User has to fill a form of appointment where they have to mention their first name, last name, phone number, medical record number (if patient is old user), department, date and time.

✚ Department Module

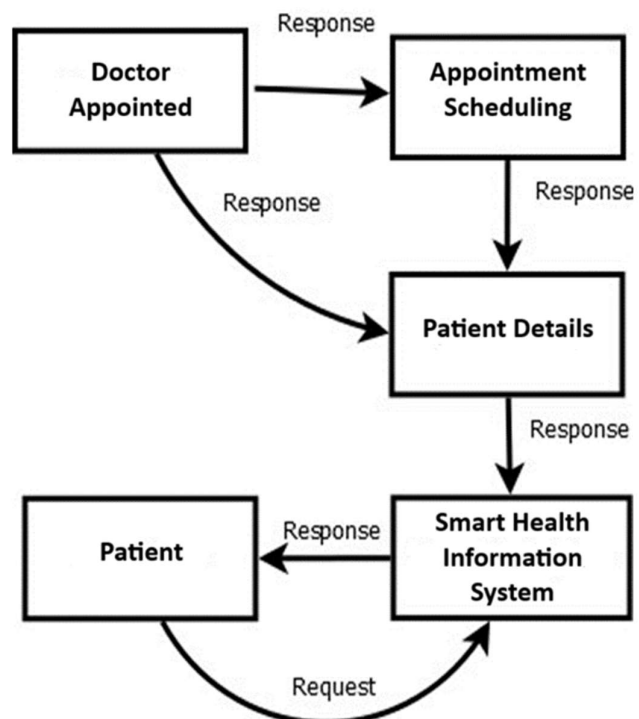
- Allow user to view the department.
- Department helps user (Patient) to know about what kind of disease they are suffering from.
- Department has detailed information about each and every disease.
- After taking the information about which kind of disease patient is suffering from. They can schedule the appointment based on the department.

3.1.1. Data Flow Diagram

Level 0 DFD – Smart Health Information System



Level 1 DFD – Smart Health Information System



4. Web View

Homepage



About Page

WELCOME TO SMART HEALTHCARE

OUR STORY

In a small town nestled among rolling hills, a dedicated nurse named Sarah worked tirelessly at the local clinic, providing compassionate care to everyone who walked through the door. From tending to the elderly residents with chronic conditions to comforting anxious children with scraped knees, Sarah approached each patient with kindness and expertise. Her unwavering commitment to health care not only healed wounds but also brought together the community, reminding them of the importance of empathy and support in times of need. Sarah's selfless dedication became a beacon of hope, showing that a caring heart and skilled hands could truly make a difference in people's lives.



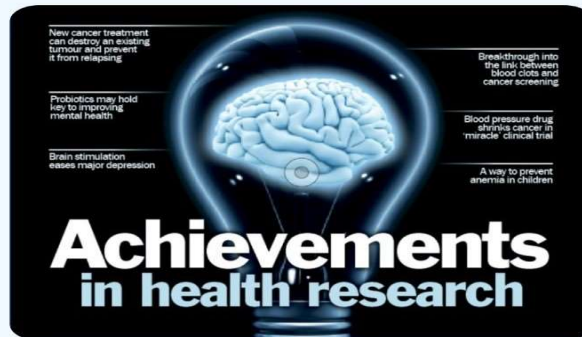
MOVEMENT

One major thrust of the health movement has been to generate public awareness regarding the commercialised, and to an extent, the exploitative nature of health care in our country today, and to generate pressure for changes in health policies, making them responsive to people's needs.

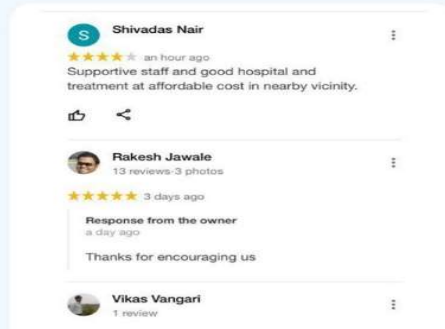


ACHIEVEMENT

ISO 9001:2000 (period from 2001-2008 now NABH), NABH (National Accreditation board for Hospitals & Healthcare) since 2011 (SK Son Hospital) & 2013 (Soni Hospital), CGHS (Central Government Health Scheme), ECHS etc. We are also recognized for the treatment of BPL (Below Poverty Line) patients, Government employees, Central Government Employees, Railways, Military, Insurance Companies etc. We are providing world-class care and treatment to our patients.>



REVIEW



Department Page

DEPARTMENT



CRITICAL CARE



DENTAL



ENT



GASTROENROLOGY



PULMONOLOGY



UROLOGY



GENERAL-MEDICINE



GERIATRIC



DERMATOLOGY



ENDOCRINOLOGY



ONCO-SURGERY



PAEDIATRIC-CARDIOLOGY

Appointment Page

BOOK AN

Appointment

Name

Phone no.

Medical record no.

Date

Time

Select Department ▼

Submit

For new patient please Sign up [Sign in](#)
Go to home [Home](#)

After Submission:

Thankyou your Appointment has booked

For any enquiry contact on this no. 123 456 789
Go to home [Home](#)

Login Page



The login page features a light blue background. In the center, there is a white rectangular box with a light blue border. Inside this box, the word "Login" is written in bold black text at the top. Below it, there are two input fields: "Username/Email" and "Password". At the bottom of the box is a green "Submit" button. Below the box, the text "not have an account" is followed by two blue underlined links: "Sign up here" and "home".

Login

Username/Email

Password

Submit

not have an account [Sign up here](#)
[home](#)

Sign Up Page



The sign up page has a light gray background. In the center, there is a white rectangular box with a light blue border. Inside this box, the words "Sign up" are written in bold black text at the top. Below it, there are six input fields: "First name", "Last name", "Username", "Email", "Create Password", and "Confirm password". At the bottom of the box is a green "Submit" button. Below the box, there is a line of text: "by clicking the sign up button, you agree to our" followed by three blue underlined links: "terms", "condition", and "policy privacy". At the very bottom, the text "already have an account? login" is followed by a blue underlined link: "Home".

Sign up

First name

Last name

Username

Email

Create Password

Confirm password

Submit

by clicking the sign up button, you agree to our
[terms](#) [condition](#) [policy privacy](#)

already have an account? [login](#)
[Home](#)

5. Conclusion

The Smart Health Information System (SHIS) project focuses on creating a user-friendly front-end interface that simplifies healthcare management for both patients and providers. This system includes essential features like home, department, about, login, signup, and appointment scheduling, designed to enhance the overall user experience and efficiency of healthcare services.

5.1. Key Features

- **Home:** Provides an overview of the SHIS, highlighting its features and benefits.
- **Department:** Offers information about various departments within the healthcare facility, making it easier for users to find relevant services.
- **About:** Shares details about the healthcare facility, its mission, and its team, building trust and transparency.
- **Login and Signup:** Ensures secure access to the system for both new and returning users, facilitating personalized experiences.
- **Appointment Scheduling:** Allows patients to easily book and manage their appointments, reducing the administrative burden on healthcare providers and improving patient satisfaction.

5.2. Enhancing User Experience

By focusing on these core features, SHIS aims to make healthcare management more accessible and efficient. The intuitive design ensures that users can easily navigate the system, whether they are scheduling an appointment or learning more about the healthcare services offered.

5.3. Future Prospects

As SHIS evolves, there is potential to integrate additional functionalities such as patient data management, notifications, and analytics. These enhancements will further improve the efficiency and effectiveness of healthcare delivery.

5.4. Final Thoughts

In conclusion, the SHIS front-end project successfully provides a streamlined and user-friendly interface that addresses key aspects of healthcare management. By simplifying processes like appointment scheduling and user authentication, SHIS enhances the overall healthcare experience for both patients and providers. This project lays a solid foundation for future developments that can further advance healthcare services.

6. References

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