

Hospital Management Information System (H-MIS)

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Title: Improving in-hospital patient management, EMR automation, medical data interoperability and security with a blockchain-based Hospital Management Information System

Introduction

In today's dynamic healthcare landscape, efficient patient management and electronic medical record (EMR) automation are critical for enhancing healthcare services. This project thesis aims to address these challenges by proposing the development and implementation of a blockchain-based Hospital Management Information System (H-MIS) that revolutionizes patient management and EMR automation within hospital settings.

Problem Statement

Traditional hospital management systems often face issues of data silos, lack of interoperability, and manual EMR handling, leading to operational inefficiencies and compromised patient care. Additionally, patient data security and privacy concerns are paramount in today's digitized healthcare environment. A blockchain-based solution can provide the required transparency, security, and data integrity while streamlining patient management processes.

Objectives

This project seeks to achieve the following objectives:

1. Design and develop a blockchain-based Hospital Management Information System (H-MIS) that integrates patient management and EMR automation.
2. Enhance patient care and hospital operational efficiency through seamless data sharing and real-time updates.
3. Ensure data security, privacy, and integrity using blockchain technology:
 - a. Security – improving the resistance of the HMIS towards various attacks (<some attacks which can be tested>)
 - b. Privacy – Enable the sharing of medical records created through the HMIS system to the patients through the Ayushman Bharat Health Account (ABHA) framework, while maintaining privacy of the patient's data.
 - c. Integrity – Demonstrate the auditability of the data recorded on the blockchain for quick insurance verification, and validate the claim through existing insurance service providers and third-party administrators (TPAs)

4. Evaluate the performance and effectiveness of the proposed system through simulations and real-world testing and analyze the advantages of employing a blockchain-based HMIS.

Methodology

The project will involve the following key steps:

1. Requirement Analysis
 - a. Collaboration with Mohan Diabetes Specialty Center, Chennai professionals to identify specific requirements for patient management and EMR automation, and to understand the information flow in an in-patient scenario.
 - b. Research about the regulatory requirements as mandated by the Data Protection Bill and the Ayushman Bharat Digital Mission (ABDM) framework, and incorporate the same into the system.
2. System Design
 - a. A comprehensive architecture for the blockchain-based HMIS will be developed and shall also be checked with the healthcare center's IT team, for security, data isolation, and other standards.
 - b. Modules for daily operations, such as patient registration, appointment scheduling, EMR updates, and billing will be included to ensure the existing flow in the hospital is not tampered with.
3. User Interface
 - a. Design an intuitive and user-friendly interface for hospital staff to interact with the system effectively.
 - b. Develop applications for multiple platforms to improve instant data collection and sharing in in-patient scenarios.
4. Blockchain Integration
 - a. Implement a blockchain network to ensure secure and tamper-proof storage of patient data and enable the quick synchronization of all systems within the healthcare center.
 - b. Create an Auditory Interface for auditing of medical records for verifying the possibility of quick insurance claims through blockchain-based insurance claim verification.
5. Testing and Validation
 - a. Simulate system behavior by employing the system in a controlled environment and testing the synchronization of the systems.
 - b. Conducting user acceptance testing and validating the system's performance in the controlled environment.
6. Real-world Implementation
 - a. Deploy the system in a hospital setting and gather feedback from healthcare professionals, patients and other stakeholders.

Expected Outcomes

The successful completion of this project is anticipated to yield the following outcomes:

1. A functional blockchain-based H-MIS prototype demonstrating improved patient management and EMR automation.
2. Enhanced hospital operational efficiency, leading to reduced wait times, streamlined processes, and improved patient care.
3. Improved data security, privacy, and integrity through blockchain technology.
4. Insights into the practical applicability and challenges of implementing blockchain in healthcare systems.

Significance

This project contributes to the healthcare industry by addressing critical challenges in patient management and EMR automation. It introduces a novel approach using blockchain technology to ensure data security, transparency, and interoperability. The proposed H-MIS has the potential to significantly improve hospital workflows and patient experiences, majorly categorized as:

1. Availability
 - a. Data created in multiple departments will be available to doctor in-charge of the individual patient in interest, hence reducing the possibility of emergencies
 - b. Since the PACS module is integrated within the hospital, the patient profile is completely shown to the health professional at any instant, with the entire history of reports and readings collected over the course of the diagnosis.
2. Auditability
 - a. The medical data and reports are all recorded on the blockchain database, hence creating a timestamped ledger of all the events. This proves easier to the insurance providers for verification of insurance claims, hence reducing discharge times for in-patients.
 - b. Hospital administration can exhibit complete transparency in terms of EMR maintenance by using the Auditory Interface for verifying claims from patients.
3. Accessibility
 - a. Through the ABDM framework, the records created by the healthcare center will be seamlessly shared to the patients. The records will be available to the patient through any digital platform and can be accessed with ABHA.

Conclusion

The proposed project thesis aims to create a groundbreaking blockchain-based Hospital Management Information System that transforms in-hospital patient management and EMR automation. By seamlessly integrating blockchain technology, this solution holds promise for revolutionizing healthcare services and setting new standards for patient care and data security.