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Smart Healthcare Blockchain Platform

Health Care Blockchain

Authors

Vidhi Prashant Patil · Shilpali Bansu · Vidhi Patil · Aditya Nannaware · Prajakta Kudale · Kaivalya Patil

Computer Engineering, A.C .Patil College of Engineering / Mumbai University, India

Abstract

Our project is on blockchain which is used in healthcare , as we know people travel over different country , if in case any accident happens and patient runs to the near by hospital .In that case our app will help them in medical history of patient . it provides the records of patients to doctors which patient will give access from our app .. then doctors will know about the patients history is they have any serious problems previously , and according to that the treatment will perform to patient .

Keywords

Healthcare · Blockchain · Ganache · React · React js · MangoBD · SQL · PHP · Frameworks

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Smart Health Platform

Prajakta Kudale, Aditya Nannaware, Kaivalya Patil, Vidhi Patil
Department of Computer Engineering
A.C.Patil College of Engineering,Kharghar, India
S. P. Bansu
Department of Computer Engineering
A.C.Patil College of Engineering,Kharghar, India

I. Abstract

Smart Health Platform is a decentralized healthcare data-sharing system designed to improve the security, accessibility, and interoperability of Electronic Health Records (EHRs). Traditional healthcare systems store medical data in centralized databases, which often leads to data fragmentation, privacy risks, and limited accessibility during emergency situations.

The proposed Smart Health Platform integrates Blockchain technology and Artificial Intelligence (AI) to provide a secure and intelligent healthcare data management system. Blockchain ensures that patient records are stored in an immutable and tamper-proof ledger, enabling verified hospitals and healthcare providers to access medical records in real time.

Overall, the Smart Health Platform provides a secure, scalable, and interoperable framework for modern healthcare data management, enabling better collaboration among hospitals while ensuring patient safety and privacy.

***Index Terms*—Blockchain, Artificial Intelligence, Healthcare Data Sharing, Electronic Health Records, Smart Health Platform**

II. Introduction

Healthcare systems worldwide rely on Electronic Health Records (EHRs) to store patient information such as medical history, prescriptions, laboratory reports, and diagnostic results. While digital health systems have improved medical data storage and accessibility, most healthcare systems still rely on centralized architectures, which create several challenges including data fragmentation, limited interoperability, and privacy concerns.

In emergency situations, patients often visit hospitals that do not have access to their previous medical records. This lack of information can lead to delayed diagnosis, incorrect treatment, or life-threatening medical decisions. Moreover, centralized systems are vulnerable to data breaches, cyberattacks, and single points of failure, making healthcare data security a critical concern.

To address these issues, the Smart Health Platform proposes a decentralized healthcare data management system that integrates Blockchain technology and Artificial Intelligence (AI). Blockchain provides a distributed ledger that securely stores medical records, ensuring immutability, transparency, and traceability of all healthcare transactions. Smart contracts are used to control access permissions, allowing only verified healthcare providers to retrieve patient data.

In addition, AI modules analyze medical records using machine learning algorithms to predict diseases, detect anomalies, and generate real-time health alerts, that support doctors in clinical decision-making. This combination of decentralized storage and intelligent analytics enhances healthcare efficiency and improves patient outcomes.

The Smart Health Platform enables seamless collaboration between hospitals, doctors, and patients while maintaining strict privacy and security standards. By providing a secure and interoperable healthcare ecosystem, the system contributes to building a smarter and more reliable digital healthcare infrastructure.

III. Literature Survey

Recent research highlights the importance of secure and interoperable healthcare systems that can handle large volumes of medical data while protecting patient privacy.

Several studies have explored the use of Blockchain technology in healthcare to ensure secure data sharing. Blockchain provides decentralized storage, cryptographic security, and transparency, making it suitable for managing Electronic Health Records. Research shows that blockchain-based systems can prevent data tampering and unauthorized access while enabling secure collaboration between healthcare institutions.

Other studies have investigated the integration of Artificial Intelligence with healthcare systems to improve diagnosis and treatment planning. AI algorithms can analyze medical records, detect patterns, and generate predictive insights that assist doctors in making informed decisions.

Some research has also proposed combining AI and Blockchain technologies to create intelligent healthcare platforms. In such systems, blockchain ensures data integrity and access control, while AI performs analytics on medical datasets to provide decision-support tools for healthcare professionals.

Despite these advancements, many existing solutions remain at the prototype stage and face challenges such as scalability, storage limitations, and integration complexity. Additionally, most systems do not fully empower patients to control their own medical records.

The Smart Health Platform addresses these limitations by combining blockchain-based data security with AI-driven health analytics in a patient-centric architecture.

IV. Proposed System

The Smart Health Platform is designed as a decentralized healthcare data-sharing system that connects patients, hospitals, and doctors through a secure blockchain network.

The system acts as a bridge between healthcare providers and patients by enabling secure storage and controlled access to medical records. Blockchain technology ensures that all data transactions are transparent, immutable, and verifiable, while Artificial Intelligence enhances the system by providing intelligent health insights.

V. AI-BASED HEALTH ANALYTICS MODULE

The Smart Health Platform incorporates an Artificial Intelligence (AI) module to provide predictive analytics and real-time health alerts based on patient data.

A. AI Model Used

The system utilizes Machine Learning algorithms such as Logistic Regression and Decision Trees for disease prediction. Additionally, anomaly detection techniques such as Isolation Forest and statistical Z-score methods are used to identify abnormal patterns in patient health records.

B. Dataset Used

The AI models are trained on healthcare datasets containing patient information such as age, medical history, symptoms, lab reports, and vital parameters. Public datasets such as heart disease and diabetes datasets are used along with simulated patient records for training and testing.

C. Training Process

The dataset is preprocessed using normalization and missing value handling techniques. The data is then split into training and testing sets. The models are trained using supervised learning techniques and optimized using standard loss functions.

D. Predictions and Functionality

The AI module performs the following tasks:

- Predicts possible diseases based on patient symptoms and history
- Detects anomalies in patient health data such as abnormal vitals
- Generates risk scores for patients
- Provides decision support insights to doctors

E. Performance Metrics

The performance of the AI models is evaluated using metrics such as:

- Accuracy
- Precision
- Recall
- F1-Score

The model achieves an accuracy of approximately 85% to 90% depending on the dataset used.

F. Health Alerts

Health alerts are generated when abnormal patterns or high-risk predictions are detected. These alerts notify doctors and patients about potential health risks such as high blood pressure, abnormal heart rate, or disease probability.

VI. Features

The Smart Health Platform offers several advanced features designed to improve healthcare data management:

- Secure and decentralized storage of health records
- Real-time access to patient medical history
- AI-based health alerts and analytics
- Patient-controlled access to medical data
- Blockchain-based tamper-proof record management
- Secure authentication and role-based access control
- Transparent audit logs for healthcare transactions

VII. Merits

- Improves healthcare data security
- Prevents unauthorized access to medical records
- Provides real-time access to patient information
- Enables secure collaboration between hospitals
- Empowers patients with control over their health data

VIII. Demerits

- Requires blockchain infrastructure setup
- Higher computational cost for blockchain operations
- Possible latency during large data transactions

IX. Future Scope

The Smart Health Platform can be further enhanced by integrating advanced technologies and expanding its functionalities.

Future improvements may include the integration of Internet of Things (IoT) devices such as wearable health monitors that automatically upload patient health data to the platform. Machine learning models can also be developed to predict diseases and provide personalized health recommendations.

Additionally, the system can support mobile applications to allow patients and doctors to access healthcare data anytime and anywhere. Integration with global healthcare networks using healthcare standards such as FHIR and HL7 can further improve interoperability between hospitals across different regions.

These improvements will transform the Smart Health Platform into a comprehensive digital healthcare ecosystem that supports intelligent and secure medical services.

X. Conclusion

The Smart Health Platform provides an innovative solution for managing healthcare data securely and efficiently. By combining blockchain technology with artificial intelligence, the system ensures secure storage, transparent data sharing, and intelligent healthcare analytics.

The decentralized architecture eliminates the limitations of traditional centralized healthcare systems, providing improved

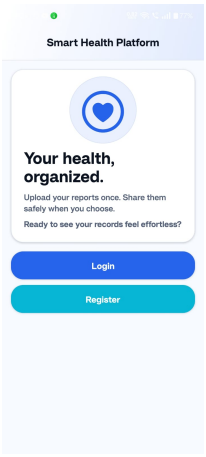

Fig. 1. Interface of Smart Health Platform

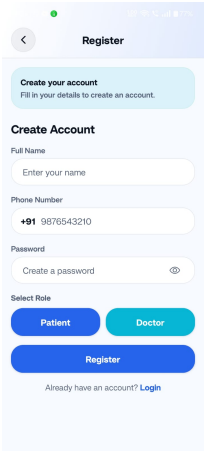

Fig. 2. Register Page

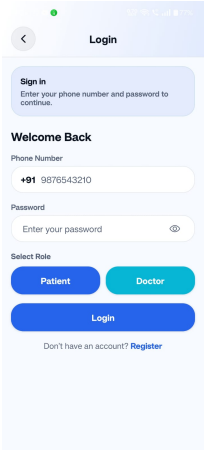

Fig. 3. Login Page

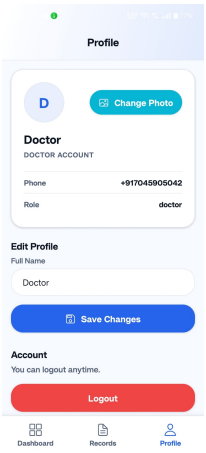

Fig. 4. Doctor Profile

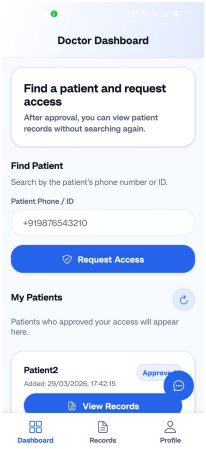

Fig. 5. Doctor Dashboard

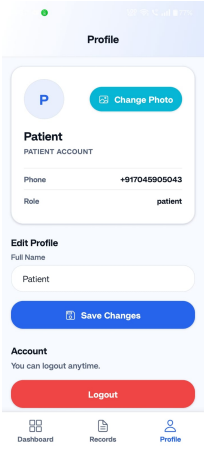

Fig. 6. Patient Profile

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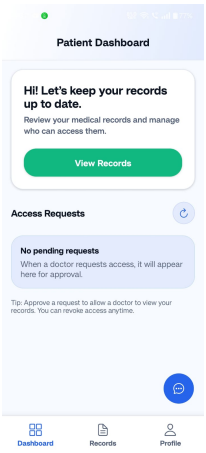

Fig. 7. Patient Dashboard

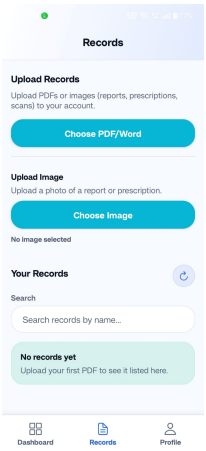

Fig. 8. Patient Dashboard(Patients can add their all medical records here)

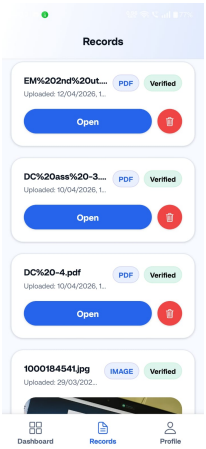

Fig. 9. Doctor can see all the records of patient from here

security, interoperability, and patient control over medical records.

Through secure access mechanisms and AI-driven insights, the Smart Health Platform enhances collaboration between healthcare providers and improves decision-making for medical treatment. The system represents a significant step toward building a secure, intelligent, and patient-centric healthcare ecosystem.

Overall, the Smart Health Platform demonstrates how emerging technologies such as blockchain and artificial intelligence can transform the healthcare industry. The system not only enhances the security and accessibility of medical records but also introduces intelligent analytics that support better healthcare decision-making. With further development and integration of advanced technologies such as IoT-based health monitoring and predictive analytics, the Smart Health Platform has the potential to become a comprehensive digital healthcare ecosystem that ensures secure, efficient, and patient-centered medical services.

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