



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 5, May 2025

AI DataLock: A Novel Approach to Safeguard Healthcare Data using Blockchain and Attribute-Based Encryption

Mohammed Shamsad kk¹, Muhammed Shafnad A², Najmudheen kp³, Minhas Mohammed ⁴,

Mr A Mohammed Noordeen ⁵

UG Scholar, Department of Artificial Intelligence and Data Science, Dhaanish Ahmed Institute of Technology,
Coimbatore, Tamil Nadu, India¹

UG Scholar, Department of Artificial Intelligence and Data Science, Dhaanish Ahmed Institute of Technology,
Coimbatore, Tamil Nadu, India²

UG Scholar, Department of Artificial Intelligence and Data Science, Dhaanish Ahmed Institute of Technology,
Coimbatore, Tamil Nadu, India³

UG Scholar, Department of Artificial Intelligence and Data Science, Dhaanish Ahmed Institute of Technology,
Coimbatore, Tamil Nadu, India⁴

Assistant Professor, Department of Computer Science and Engineering, Dhaanish Ahmed Institute of Technology,
Coimbatore, Tamil Nadu, India⁵

ABSTRACT: Electronic Medical Records (EMRs) and wearable sensor health data, such as real-time physiological metrics (e.g., heart rate, ECG, temperature), are essential for patient care and are increasingly collected for analysis and treatment. However, this sensitive health data is vulnerable to unauthorized access and cyber-attacks, particularly when stored in cloud environments. Existing security protocols for EMRs and wearable sensor data often fail to provide adequate protection, leading to issues such as weak encryption, insufficient access control, and a lack of accountability in the event of data breaches. These shortcomings contribute to privacy concerns and data loss, undermining the integrity of healthcare systems. To address these challenges, the AI DataLock framework is proposed. This innovative system integrates Hierarchical Key – Attribute-Based Encryption (HE-ABE) and Blockchain technology to establish secure, fine-grained access control for sensitive health data. HE-ABE encrypts patient data, ensuring that only individuals with the correct attributes (such as medical professionals with appropriate roles) can access and decrypt the information. The system's fine-grained access control allows for the specification of exact permissions based on attributes, improving data confidentiality. Blockchain is employed to provide a decentralized and immutable ledger for storing data transactions, enabling tamper-proof auditing, transparent management of data access, and secure session management. These features collectively ensure the integrity of health data, protect patient privacy, and ensure that only authorized users can access and manipulate sensitive health records. The proposed system enhances the confidentiality, integrity, and accountability of healthcare data in the cloud, fostering trust in the digital management of health information while safeguarding sensitive patient data from unauthorized access and malicious attacks.

KEYWORDS: Electronic Medical Records (E MRs), AI DataLock framework, Secure session management

I. INTRODUCTION

In today's healthcare systems, Electronic Medical Records (EMRs) and wearable sensor data play a vital role in monitoring patients and delivering timely medical care. However, storing this data on cloud platforms introduces serious risks, including unauthorized access, data breaches, and lack of control over who can view sensitive information.

Current systems often fail to provide strong encryption, flexible access control, and secure transaction handling. To solve these issues, this project introduces a smart and secure solution by combining Hierarchical Key – Attribute-Based Encryption (HE-ABE) with Blockchain technology. HE-ABE allows only the right users—like doctors, patients, or pharmacists—to access specific data based on their roles. Blockchain ensures that all records are tamper-proof and transparent, preventing any unauthorized changes.

In addition, the system includes a Medicine Availability and Recommendation feature, which checks real-time stock in pharmacies and suggests alternative medicines when required. This improves both security and patient convenience, making healthcare smarter and more reliable.

II. RELATED WORK

Securing healthcare data and ensuring its accessibility has been a subject of significant research. Prior efforts have focused on enhancing data protection through traditional encryption techniques like AES and ECC, as well as emerging methods such as Homomorphic Encryption. While these approaches provide a baseline of security, many fall short in delivering fine-grained access control, tamper-proof auditability, and real-time service availability.

Recent works have introduced Role-Based Access Control (RBAC) mechanisms to manage healthcare permissions. However, these systems often lack the flexibility to adapt to the dynamic roles within a healthcare environment. Furthermore, real-time medicine tracking and recommendation systems are either rudimentary or non-existent in legacy healthcare solutions.

The integration of Blockchain in healthcare has shown promise for immutable data storage, audit trails, and enhanced transparency. For instance, blockchain-based architectures have been used to verify Electronic Medical Records (EMRs) and patient consent history. Similarly, Attribute-Based Encryption (ABE) and its variants, such as Hierarchical Key – ABE (HE-ABE), have been leveraged to enable fine-grained access control based on user attributes, enhancing data confidentiality.

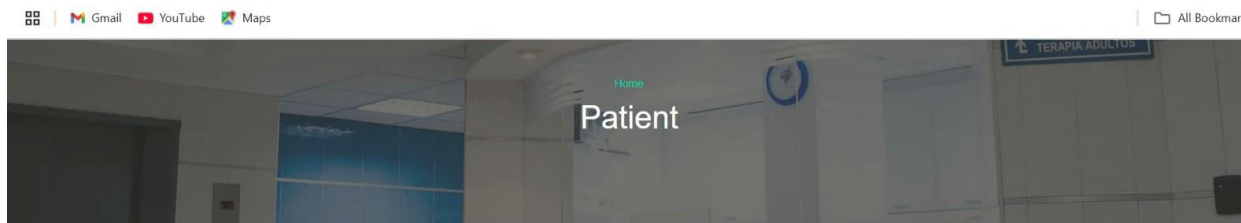
III. METHODOLOGY

The proposed system, AI Health Data Lock, employs a multi-layered approach to ensure the security, integrity, and accessibility of healthcare data, integrating advanced cryptographic techniques with blockchain and real-time service features. The methodology is divided into the following modules:

- **Web Application:** A centralized web platform, built with Python (Flask) and MySQL, connects doctors, patients, pharmacists, and admins. It manages EMRs, prescriptions, and medicine inventory.
- **HE-ABE Encryption:** Hierarchical Key – Attribute-Based Encryption (HE-ABE) ensures only authorized users can access sensitive health data. The Key Generation Centre issues master and attribute-based keys, enabling fine-grained access control.
- **Blockchain for Integrity:** Blockchain records all data transactions to ensure tamper-proof storage and auditability. SHA-256 hashing verifies data integrity, with alerts for any inconsistencies.
- **Medicine Recommendation System:** Linked with pharmacy databases, this module tracks real-time medicine availability and suggests alternative medications when needed.
- **Role-Based Access Control (RBAC):** RBAC restricts system functions by role: doctors update EMRs, pharmacists manage stock, and patients view their records and prescriptions.

IV. EXPERIMENTAL RESULTS

The implementation of this system demonstrates significant improvements in the secure handling and sharing of healthcare data. Data privacy is maintained through strong encryption, while blockchain ensures data integrity and auditability. The integration with pharmacy databases adds a real-time, practical dimension to patient care by preventing treatment delays due to unavailable medications. This ensures data privacy, integrity, and improved patient care delivery through secure and intelligent automation.

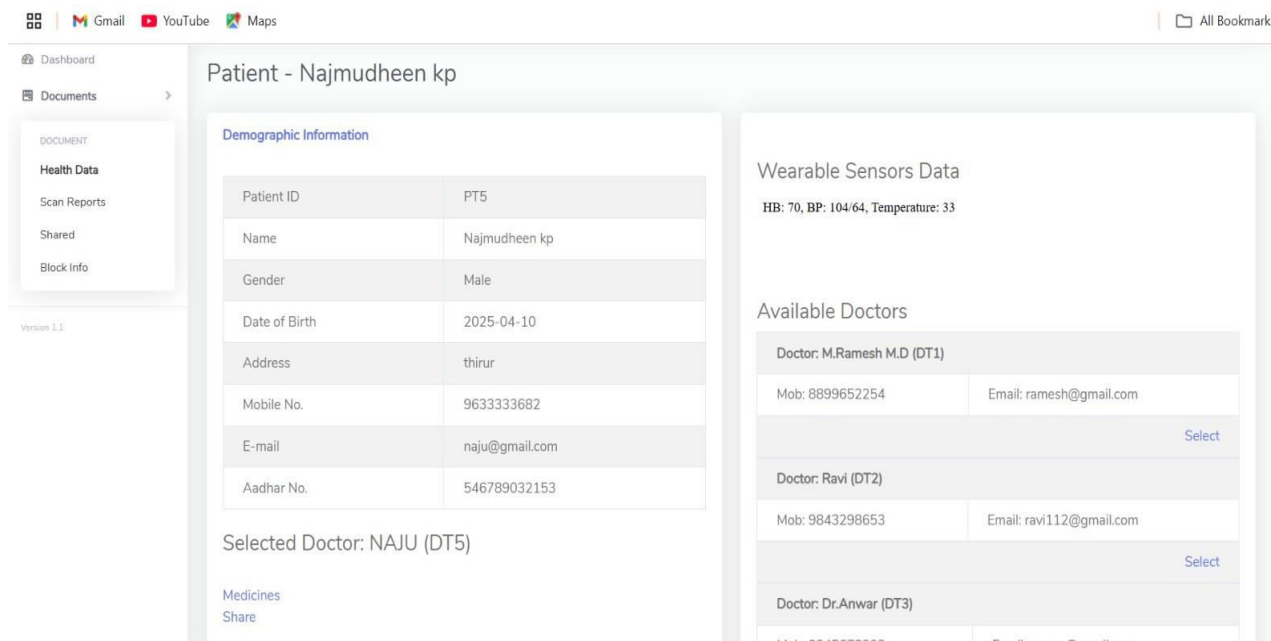


Patient

Username

Password

[Login](#) [Create New](#)



Patient - Najmudheen kp

Demographic Information

Patient ID	PT5
Name	Najmudheen kp
Gender	Male
Date of Birth	2025-04-10
Address	thirur
Mobile No.	9633333682
E-mail	naju@gmail.com
Aadhar No.	546789032153

Selected Doctor: NAJU (DT5)

[Medicines](#)
[Share](#)

Wearable Sensors Data

HB: 70, BP: 104/64, Temperature: 33

Available Doctors

Doctor: M.Ramesh M.D (DT1)	
Mob: 8899652254	Email: ramesh@gmail.com
Select	
Doctor: Ravi (DT2)	
Mob: 9843298653	Email: ravi112@gmail.com
Select	
Doctor: Dr.Anwar (DT3)	
Mob: 7245678903	Email: anwar@gmail.com

V. CONCLUSION

The AI Health Data Lock effectively combines encryption, blockchain, and real-time data integration to enhance data security and patient care. However, existing systems often implement these technologies in isolation, missing the synergistic benefits of combining them. In contrast, the proposed project integrates HE-ABE for secure access control and Blockchain for tamper-proof storage, alongside a Medicine Availability and Recommendation System, thereby addressing both data security and patient-centric service delivery in a holistic manner. This project validates that such a system can facilitate intelligent automation in healthcare, ensuring both the confidentiality of medical data and the continuity of patient treatment.

REFERENCES

1. A. GUPTA, A. SINGH: An Intelligent Healthcare Cyber Physical Framework for Encephalitis Diagnosis Based on Information Fusion and Soft-computing Techniques. *New Gener Comput* 40 (4), 1093 (2022).
2. A. AGRAWAL, A. K. PANDEY, A. BAZ, H. ALHAKAMI, W. ALHAKAMI et al.: Evaluating the Security Impact of Healthcare Web Applications through Fuzzy Based Hybrid Approach of Multi-criteria Decision-making Analysis. *IEEE Access*, 8, 135770 (2020).
3. A. ANAND, A. K. SINGH: Cloud Based Secure Watermarking Using IWT-Schur-RSVD with Fuzzy Inference System for Smart Healthcare Applications. *Sustainable Cities and Society (SCS)*, 75, 103398 (2021).
4. M. NOUR, H. SINDI, E. ABOZINADAH, Ş. ÖZTÜRK, K. POLAT: A Healthcare Evaluation System Based on Automated Weighted Indicators with Cross-indicators Based Learning Approach in Terms of Energy Management and Cybersecurity. *Int J Med Inform*, 144, 104300 (2020).
5. H. Wu, Y. Shang, L. Wang, L. Shi, K. Jiang, and J. Dong, "A patient-centric interoperable framework for health information exchange via blockchain," in *Proc. 2nd Int. Conf. Blockchain Technol. Appl.*, Dec. 2019, pp. 76-80.
6. M. S. Rahman, I. Khalil, P. C. Mahawaga Arachchige, A. Bouras, and X. Yi, "A novel architecture for tamper proof electronic health record management system using blockchain wrapper," in *Proc. ACM Int. Symp. Blockchain Secure Crit. Infrastruct. (BSCI)*, 2019, pp. 97-105.
7. F. Khan, A. U. Rehman, Z. Yanliang, S. Mastorakis, H. Song, M. A. Jan, and K. Dev, "A Secured and Reliable Continuous Transmission scheme in Cognitive HARQ-aided Internet of Things," *IEEE Internet of Things Journal*, Early Access, 2021.
8. R. K. Mahendran and P. Velusamy, "A secure fuzzy extractor based biometric key authentication scheme for body sensor network in internet of medical things," *Computer Communications*, vol. 153, pp. 545–552, 2020.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details