International Journal of Engineering Research and Science & Technology

www.ijerst.org

ISSN : 2319-5991

Vol. 22 No. 2(3) (2026)

ijerst.editor@gmail.com

editor@ijerst.com

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com

Peer Reviewed, Referred & Indexed Journal

Research Paper

SECURE DATA WITH BLOCK CHAIN AND ARTIFICIAL INTELLIGENCE USING HEALTHCARE APPLICATION

KOPANATHI NAGA JYOTHI
kopanathi.jyothi7@gmail.com
24NH1D5808
K RANJITHAKALA
ranjitha.kala@gmail.com
ASSOCIATE PROFESSOR
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
V.K.R, V.N.B & A.G.K College of Engineering

ABSTRACT

The rapid growth of digital healthcare systems has increased the need for secure, reliable, and intelligent data management solutions to protect sensitive patient information. Traditional healthcare data storage systems often face challenges such as data breaches, unauthorized access, poor interoperability, and lack of transparency in medical record management. To address these issues, this study proposes a secure healthcare framework that integrates Blockchain technology and Artificial Intelligence (AI) for efficient and secure healthcare applications. Blockchain provides a decentralized and tamper-resistant platform for storing electronic health records (EHRs), ensuring data integrity, transparency, and secure access control among patients, hospitals, doctors, and healthcare providers. Artificial Intelligence techniques are incorporated to support intelligent healthcare services such as disease prediction, patient monitoring, medical image analysis, and clinical decision-making. Smart contracts are used to automate authentication, data sharing permissions, and secure medical transactions while maintaining patient privacy. The proposed system enhances cybersecurity, prevents unauthorized data modification, improves interoperability between healthcare institutions, and enables efficient healthcare analytics using AI models. Experimental analysis demonstrates that the integration of blockchain and AI improves healthcare data security, operational efficiency, diagnostic accuracy, and trust in digital healthcare systems. This research highlights the potential of combining blockchain technology and artificial intelligence to develop secure, intelligent, and patient-centered healthcare applications for modern medical environments.

Received: 20-03-2026 Accepted: 28-04-2026 Published: 04-06-2026

INTRODUCTION

The healthcare industry is rapidly adopting digital technologies for managing patient information, medical records, diagnostics, and healthcare services. Electronic Health Records (EHRs), telemedicine systems, wearable health devices, and cloud-based healthcare platforms have improved the efficiency and accessibility of medical services. However, the increasing use of digital healthcare systems has also introduced major challenges related to data security, privacy, interoperability, and unauthorized access to sensitive patient information.

Healthcare data is highly confidential and valuable, making it a common target for cyberattacks, data breaches, and unauthorized modifications. Traditional centralized healthcare databases often suffer from issues such as single points of failure, poor transparency, limited data sharing capabilities, and vulnerability to hacking. These limitations can compromise patient privacy, reduce trust in healthcare systems, and affect the quality of

medical services. Therefore, there is a strong need for secure and intelligent healthcare data management solutions.

Blockchain technology has emerged as a powerful solution for ensuring secure, transparent, and tamper-resistant data storage in healthcare applications. Blockchain is a decentralized digital ledger that records transactions securely across multiple nodes, making it extremely difficult to alter or manipulate stored information. In healthcare systems, blockchain can securely manage electronic health records, medical transactions, patient identities, and access permissions while ensuring data integrity and traceability.

Artificial Intelligence (AI) further enhances healthcare applications by enabling intelligent data analysis, disease prediction, medical image processing, patient monitoring, and clinical decision support. AI algorithms can analyze large amounts of healthcare data to identify patterns, predict diseases, and assist doctors in making accurate medical decisions. The integration of AI with blockchain technology creates a secure and intelligent healthcare ecosystem that improves both data protection and healthcare efficiency.

The proposed system focuses on combining Blockchain and Artificial Intelligence for secure healthcare data management and advanced healthcare applications. Blockchain technology is used to store and share patient records securely, while AI techniques are applied for predictive analytics, diagnosis support, and intelligent healthcare monitoring. Smart contracts are implemented to automate authentication, access control, and secure data sharing among patients, doctors, hospitals, and healthcare providers.

The main objective of this project is to enhance healthcare data security, improve interoperability between medical institutions, reduce unauthorized access, and support intelligent healthcare services. The proposed framework aims to create a reliable, transparent, and patient-centered healthcare system that ensures both data privacy and efficient medical decision-making in modern healthcare environments.

LITERATURE SURVEY

1. "Blockchain Technology in Healthcare: A Comprehensive Review"

Authors: Azaria Asaph, Ekblaw Ariel, Vieira Thiago, and Lippman Andrew

Description:

This research explored the use of blockchain technology for secure healthcare data management. The authors proposed a decentralized framework called MedRec for managing electronic medical records using blockchain. The study highlighted improved data privacy, interoperability, and patient control over healthcare information.

2. "Artificial Intelligence in Healthcare: Applications and Challenges"

Authors: Jiang Fei, Jiang Yong, Zhi Hui, Dong Yi, and Wang Hao

Description:

The paper discussed various AI applications in healthcare, including disease prediction, medical image analysis, patient monitoring, and clinical decision support systems. The study emphasized the ability of AI algorithms to improve diagnostic accuracy and healthcare efficiency while reducing manual workload.

3. "Secure Electronic Health Records Using Blockchain Technology"

Authors: Kuo Tai-Cheng, Kim Hyeon-Eui, and Ohno-Machado Lucila

Description:

This study focused on using blockchain technology to secure Electronic Health Records (EHRs). The authors explained how decentralized storage and cryptographic security mechanisms can protect sensitive healthcare data from unauthorized access and tampering.

4. "Blockchain for Healthcare Data Sharing"

Authors: Xia Qian, Sifah Emmanuel Ben, Smahi Abla, and Gao Jianhua

Description:

The research proposed a blockchain-based healthcare data sharing system that enables secure communication among hospitals,

patients, and healthcare providers. Smart contracts were used to manage access permissions and ensure privacy-preserving medical data exchange.

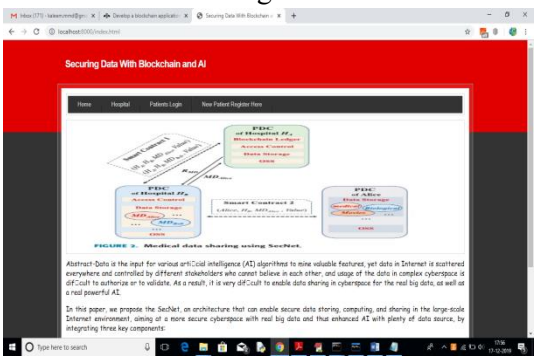
SYSTEM ARCHITECTURE

IMPLEMENTATION

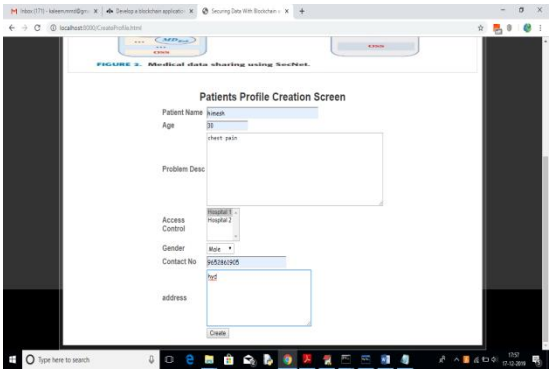
First create database in MYSQL by copying content from 'DB.txt' file and paste in MYSQL.

In settings file change port no from 3308 to 3306 and in 'views.py' file also change port no to 3306

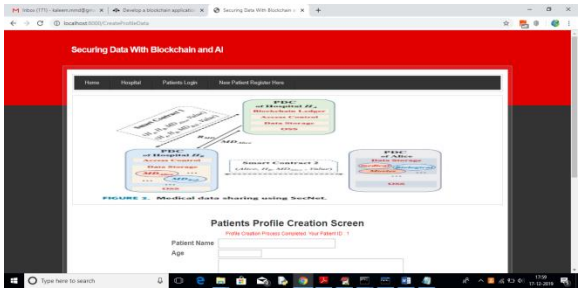
Deploy code on DJANOGO and start server and run in browser to get below screen



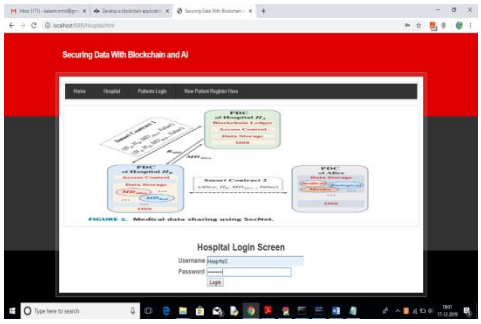
In above screen click on 'New Patient Register Here' link to get below screen



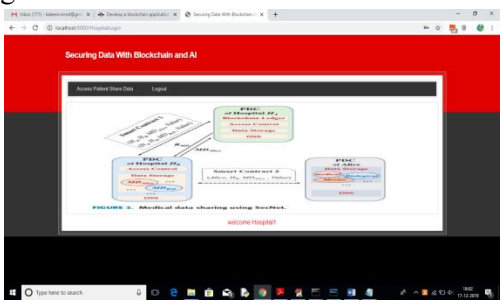
In above screen I am adding patient disease details and selecting 'Hospital1' to share my data and if you want to share with two hospitals then hold 'CTRL' key and select both hospitals to give permission. Now press 'Create' button to create profile



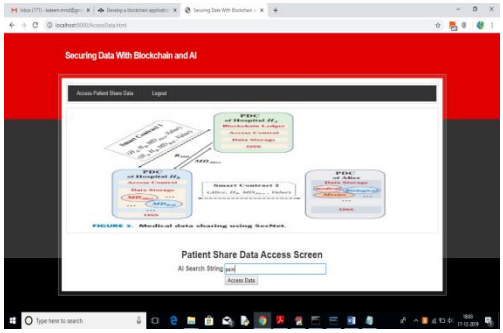
In above screen one patient is created with patient ID 1 and now Hospital 1 can login and search and access this patient data as patient has given permission to Hospital1



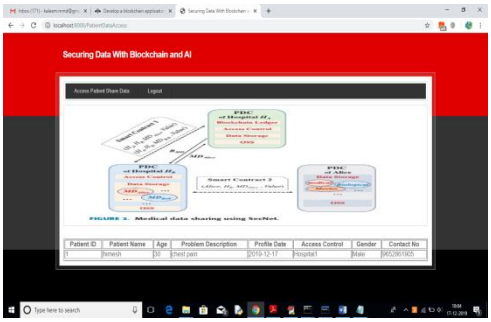
In above screen to login as Hospital1 click on 'Hospital' link to get above screen. Use 'Hospital1' as username and 'Hospital1' as password to login as Hospital1 and use Hospital2 to login as Hospital2. After login will get below screen



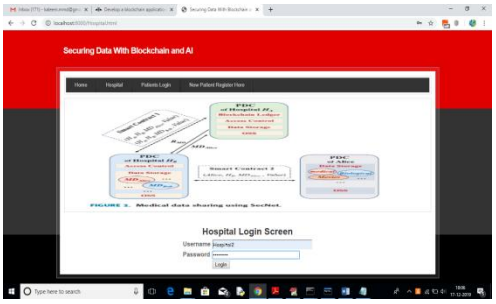
In above screen click on 'Access Patient Share Data' link to search for patient details



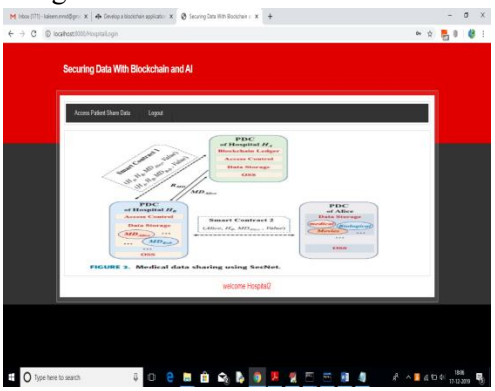
In above screen I want to search for all patients who are suffering from 'pain' and then click on 'Access data' button to get below screen



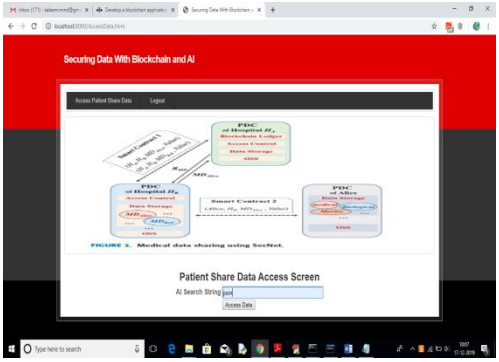
In above screen Hospital1 getting details of patient and Hospital2 not having permission so it will not get details. To see this logout and login as 'Hospital2'



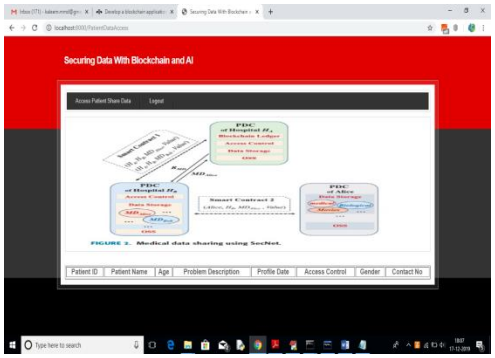
In above screen 'Hospital2' is login, after login will get below screen



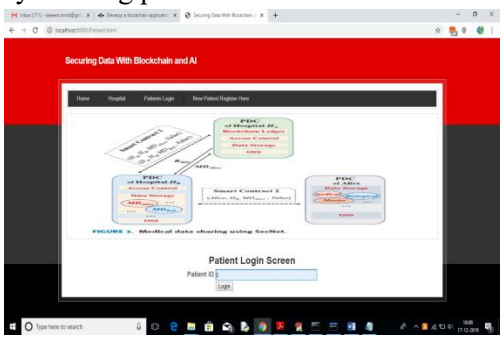
Now click on 'Access Patient Share Data' link and search for same pain disease



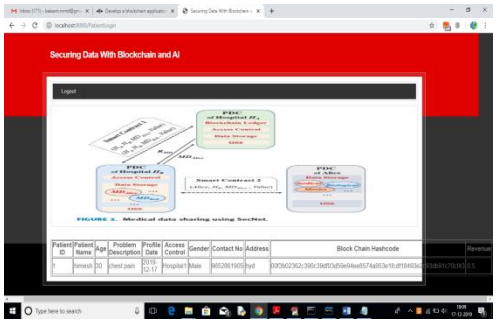
For above query will get below result



In above screen no patient details are showing as Hospital2 not having permission. So block chain allow only those users to access data who has permission. Now logout and login as patient by entering patient id in below screen



After login will get below details for patient 1



In above screen we can see patient all details and hash code generated by block chain and in last column we can see patient reward revenue as 0.5 and it will get update upon every access from hospital user.

CONCLUSION

The rapid digital transformation of healthcare systems has increased the need for secure, transparent, and intelligent data management solutions. Traditional healthcare systems often face serious challenges such as data breaches, unauthorized access, lack of interoperability, and inefficient management of electronic health

records. These issues can compromise patient privacy, reduce trust in healthcare services, and affect the quality of medical decision-making.

The proposed system integrating Blockchain and Artificial Intelligence provides an effective solution for secure healthcare applications. Blockchain technology ensures decentralized, tamper-resistant, and transparent storage of healthcare data, allowing secure sharing of electronic medical records among patients, doctors, hospitals, and healthcare providers. The use of cryptographic security and smart contracts enhances authentication, access control, and secure medical transactions while maintaining patient privacy.

Artificial Intelligence further improves healthcare services by enabling intelligent disease prediction, medical image analysis, patient monitoring, and clinical decision support. AI algorithms can process large amounts of healthcare data efficiently and assist healthcare professionals in making faster and more accurate medical decisions. The combination of blockchain and AI creates a reliable and intelligent healthcare ecosystem that enhances both security and operational efficiency.

The proposed framework improves healthcare data integrity, reduces the risk of unauthorized data modification, supports interoperability among healthcare institutions, and increases trust in digital healthcare systems. Overall, this research demonstrates that the integration of blockchain technology and artificial intelligence can significantly enhance cybersecurity, healthcare analytics, and patient-centered medical services in modern healthcare environments.

FUTURE WORK

The proposed blockchain and artificial intelligence-based healthcare system can be further enhanced by integrating advanced technologies and expanding its capabilities for large-scale real-world healthcare applications. Future research can focus on improving scalability, interoperability, real-time analytics, and intelligent healthcare services while maintaining strong security and privacy protection.

One important enhancement is the integration of Internet of Things (IoT) and wearable healthcare devices for continuous patient monitoring. Real-time health data such as heart rate, blood pressure, glucose levels, and body temperature can be securely stored on the blockchain and analyzed using AI algorithms for early disease prediction and emergency alerts.

Future work can also include the development of federated learning techniques that allow AI models to learn from distributed healthcare data without directly sharing sensitive patient information. This approach can improve privacy preservation while enabling collaborative medical research and intelligent healthcare analytics across multiple hospitals and healthcare organizations.

Another possible improvement is the implementation of advanced explainable AI (XAI) models to provide transparent and interpretable medical predictions. Explainable AI can help doctors and healthcare professionals better understand AI-generated diagnoses and treatment recommendations, increasing trust in intelligent healthcare systems.

The proposed framework can be extended to support cloud-based and edge computing architectures for faster processing and large-scale healthcare data management. Integration with 5G communication networks may further improve remote healthcare services, telemedicine applications, and real-time patient monitoring systems.

REFERENCE

1. Asaph Azaria, Ariel Ekblaw, Thiago Vieira, and Andrew Lippman, “MedRec: Using Blockchain for Medical Data Access and Permission Management,” *IEEE Open & Big Data Conference*, 2016.
2. Fei Jiang, Yong Jiang, Hui Zhi, Yi Dong, and Hao Wang, “Artificial Intelligence in Healthcare: Past, Present and Future,” *Stroke and*

Vascular Neurology, vol. 2, no. 4, pp. 230–243, 2017.

3. Tai-Cheng Kuo, Hyeon-Eui Kim, and Lucila Ohno-Machado, "Blockchain Distributed Ledger Technologies for Biomedical and Health Care Applications," *Journal of the American Medical Informatics Association*, vol. 24, no. 6, pp. 1211–1220, 2017.
4. Qian Xia, Emmanuel Ben Sifah, Abla Smahi, and Jianhua Gao, "BBDS: Blockchain-Based Data Sharing for Electronic Medical Records in Cloud Environments," *Information*, vol. 8, no. 2, pp. 44–58, 2017.
5. Geert Litjens, Thijs Kooi, Babak Ehteshami Bejnordi, and Clara I. Sánchez, "A Survey on Deep Learning in Medical Image Analysis," *Medical Image Analysis*, vol. 42, pp. 60–88, 2017.
6. Venkata Ramana, P. (2024). AI-driven predictive analytics in ERP systems for proactive supply chain optimization. International Journal of Research in Information Technology and Computing, 8(4).
7. Srikanth Kavuri. (2024). Probabilistic Generative Modeling for Synthesizing High-Coverage Test Data in Safety-Critical Software Applications. Computer Fraud and Security, 633–642. https://doi.org/10.52710/cfs.838
8. Kumar Gummadi, V. P., Chilamkurthi, L. S., & Kavuri, S. (2026). Distributed Platform Architecture and API-Led Integration. 2026 International Conference on Artificial Intelligence, Systems, and Emerging Technologies (ICAISET), 1–6. https://doi.org/10.1109/icaiset66439.2026.11541787
9. Sreenivasulu Gajula. (2024). Adaptive Zero Trust Architecture for Securing Financial Microservices. Computer Fraud and Security, 643–655. https://doi.org/10.52710/cfs.845
10. Matthias Mettler, "Blockchain Technology in Healthcare: The Revolution Starts Here," *IEEE International Conference on e-Health Networking, Applications and Services*, 2016.
11. Salah K. Hassan, M. N. Halgamuge, and Ali H. Syed, "Artificial Intelligence and Blockchain Integration for Secure Healthcare Systems," *Future Internet Journal*, vol. 11, no. 7, 2019.
12. Yue Xiao, Ning Zhang, and Yuguang Fang, "Blockchain and Smart Contract for Secure Data Sharing in Healthcare," *IEEE Network*, vol. 34, no. 5, pp. 304–309, 2020.
13. Doragacharla, V. R. (2026). Building Real-Time Pricing Systems for Modern Retail. Available at SSRN 6451760.
14. Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System," 2008.
15. Mudusu, S. K. Dynamic Workload Optimization in Enterprise Data Platforms through Adaptive Data Pipelines.
16. Maturi, S. Y. (2025). Blockbond Hardening: Securing Pooled-Hash Protocols Against Traffic Tampering, MITM Hash-Rate Hijacking, and Template Coercion. https://doi.org/10.20944/preprints202512.2064.v1
17. Manoharan, D. (2026). AI-Driven Anomaly Detection Models for Preventing Claims Denials and Revenue Leakage in Healthcare. Available at SSRN 6385759.
18. Pavan Kumar Adabala. (2026). Best Practices for Enterprise System Integration in Modern Organizations. Journal of Information Systems Engineering and Management, 11(2s), 1137–1146. https://doi.org/10.52783/jisem.v11i2s.14558

19. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, *Deep Learning*, MIT Press, 2016.