

SKAP (SAFE KEEPING OF AUTHENTIC PRESS) SHIELD: CYBER-BLOCKCHAIN MECHANISMS FOR PROTECTING SENSITIVE JOURNALISTIC INFORMATION

Project Reference No.: 49S_BE_3006

College : B.V.V. Sangha's Basaveshwar Engineering College, Bagalkote
Branch : Department of Computer Science and Engineering
Guide : Dr. G. B. Chittapur
Student(s) : Ms. Arpita Naik
 Ms. Kaveri Hosamani
 Ms. U. Samira Banu
 Ms. Prerana Bali

Keywords:

Cyber Security, Blockchain, Deepfake Detection, Journalistic Data Protection, Hyperledger Fabric, Machine Learning, Priority System.

Introduction:

In today's digital era, journalism faces severe threats from data tampering, deepfake manipulation, unauthorized access, and rapid spread of misinformation. Sensitive journalistic content (images, audio, video) often lacks reliable authenticity verification, leading to loss of public trust, legal risks, and safety concerns for journalists. Traditional storage systems are centralized and vulnerable to breaches, while existing tools do not provide end-to-end immutability and traceability.

SKAP Shield was developed as a unified, secure platform specifically for journalists, media agencies, investigators, and authorities. It integrates Machine Learning for real-time deepfake/manipulation detection, Hyperledger Fabric blockchain for tamper-proof storage and audit logging, **and a Priority System for Journalists** where users with higher priority levels receive preferential treatment in processing, verification, and visibility. The system ensures every digital evidence undergoes rigorous verification before permanent recording, creating a transparent and immutable chain-of-custody. This project directly addresses real-world societal challenges of fake news.

Objectives:

1. Build a Secure Journalism Data Protection System to prevent tampering, leaks, and unauthorized access.
2. Implement ML-Based Identity Verification to detect deepfakes and manipulated content in images, audio, and video.
3. Enable Blockchain-Backed Metadata & Hash Storage on Hyperledger Fabric for decentralized, immutable verification.
4. Provide Immutable and Transparent Audit Logging for every upload, access, and verification action.
5. Create a Tamper-Proof Digital Evidence Trail to ensure credibility of journalistic files.

6. Develop a Secure Upload & Validation Platform for journalists, agencies, and investigators.
7. Implement Priority System for Journalists: Higher-priority users (senior journalists/editors) receive prioritized processing, faster ML verification, elevated visibility in audit logs, and precedence in the blockchain trail.
8. Integrate AI + Blockchain in a unified verification framework.
9. Design a Future-Ready Scalable Architecture supporting real-time threat detection and newsroom integration.

Methodology:

Requirement The proposed system is developed in a structured manner through the following phases:

1. **Requirement Analysis:** Identification of challenges faced by journalists and definition of use cases for all stakeholders, including assignment of priority levels based on journalist roles.
2. **System Design & Architecture:** Design of a modular architecture integrating Machine Learning, Hyperledger Fabric, hashing techniques, backend, and user interface. The workflow includes sign-up, OTP login, evidence upload, priority-based queuing, ML verification, SHA-256 hashing, IPFS storage, blockchain logging, and audit trail generation.
3. **User Interface Development:** Development of secure and responsive interfaces for encrypted data upload, visualization of ML results, blockchain logs, and an admin dashboard displaying priority levels.
4. **ML-Based Manipulation & Deepfake Detection:** Implementation of preprocessing pipelines and Machine Learning models to analyze media files and generate authenticity scores integrated with backend APIs.
5. **Secure Hashing & Integrity Verification:** Application of SHA-256 hashing to each file, along with metadata extraction and comparison for tamper detection.
6. **Backend Development:** Development using FastAPI with Pydantic and MongoDB (Motor driver). REST APIs handle system operations with priority-based queuing, ensuring faster processing for high-priority users.
7. **Blockchain Integration:** Configuration of Hyperledger Fabric and development of chaincode for immutable storage of hashes, metadata, verification results, access logs, and priority information.
8. **System Integration, Testing & Validation:** End-to-end testing to validate deepfake detection accuracy, data integrity, blockchain immutability, API performance, secure access control, and priority-based processing.

Result and Conclusion:

1. The proposed SKAP Shield system is expected to effectively detect deepfake and manipulated content across images, audio, and video using Machine Learning techniques. Each file will be securely processed using SHA-256 hashing, stored on IPFS, and its metadata will be immutably recorded on Hyperledger Fabric blockchain, ensuring data integrity and traceability.

2. The system is expected to provide real-time audit logs, secure OTP-based authentication, and a priority-based processing mechanism that enhances efficiency for high-priority users. The complete workflow will operate without unauthorized alterations, ensuring robust security.

In conclusion, the integration of Machine Learning and Blockchain technologies is expected to deliver a secure, scalable, and reliable solution for protecting journalistic data, reducing misinformation, and improving trust in digital media systems.

References:

- [1] Z. Li et al., "Blockchain solutions for generative AI challenges in journalism," *Frontiers in Blockchain*, 2024.
- [2] M. Vázquez-Herrero et al., "Artificial Intelligence in Journalism: A Ten-Year Retrospective of Scientific Articles," *Journal of Media*, vol. 5, no. 3, 2024
- [3] Y. Zhang et al., "Towards Transparency and Security: An Analysis of the Application of Blockchain in Digital Journalism," *AJST*, 2022.
- [4] S. Sharma et al., "A benchmark study of machine learning models for online fake news detection," *Array*, vol. 13, 2021.

Future Scope:

The future scope of this project includes:

SKAP Shield has strong potential for further development and commercialization

1. Real-time deepfake detection for live video streams and social media integration.
2. Mobile app for field journalists with offline upload and auto-sync.
3. Advanced ML models trained on larger journalistic datasets.
4. Multi-chain blockchain support and zero-knowledge proofs for enhanced privacy.
5. Integration with existing newsroom CMS and government evidence platforms.
6. Cloud scalability for high-volume news agencies.
7. **AI-assisted article writing module** that generates draft articles with built-in authenticity verification and automatic blockchain stamping before publication.
8. Patent filing for the unified AI + Blockchain verification framework with priority system.