

Blockchain Based Secure FIR Registration System

A project report submitted in partial fulfillment of the requirements

for the award of the degree of

Bachelor of Technology

by

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Certificate

This is to certify that this is the bonafide record of the application development Entitled,” **Blockchain Based Secure FIR Registratio System**” submitted by **T.Raghuchandhan(2111cs02372),B.Rahul(2111cs020373),J.Rahul(2111cs020375), M.rahul(2111cs020376),G . R a j K u m a r (2 1 1 1 c s 0 2 0 3 7 7)** of B.Tech IV Year II semester, Department of CSE (AI&ML) during the year 2024- 25.The results embodied in there port have not been submitted to any other university or institute for the award of any degree or diploma.

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ABSTRACT

The Blockchain-Based Secure FIR Registration System introduces an innovative solution to address the challenges in the traditional FIR filing process, such as data tampering, inefficiency, and lack of transparency. By leveraging blockchain technology, the system ensures that once an FIR is registered, it is securely encrypted and stored on a decentralized, immutable ledger. This prevents unauthorized modifications or deletions, providing a tamper-proof record that enhances the integrity of the FIR. The decentralized nature of blockchain eliminates the risks associated with centralization, where data can be compromised or altered by a single entity. In addition to ensuring data integrity, the system offers greater transparency, enabling both law enforcement agencies and citizens to track the status of FIRs in real time. This transparency reduces the chances of corruption, delays, and administrative bottlenecks that often plague traditional systems. The public can access the progress of their FIRs independently, fostering trust in the law enforcement process. The integration of smart contracts further streamlines the system by automating tasks such as notifications to relevant authorities and triggering predefined actions based on certain conditions, thus reducing human errors and operational inefficiencies. This automation accelerates the investigative and legal procedures, ensuring a faster response to criminal incidents. Overall, the Blockchain-Based Secure FIR Registration System offers a transformative approach to law enforcement, providing a secure, transparent, and efficient platform for FIR registration.

CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
1.	INTRODUCTION	1
	1.1 Problem Definition	
	1.2 Objective of project	
	1.3 Scope & Limitations of the project	
2.	LITERATURE SURVEY	3
3.	PROPOSED METHODOLOGY	5
	3.1 Existing System	
	3.2 Proposed System	
	3.3 Architecture	
	3.4 Methods & Algorithms	

1. INTRODUCTION

1.1 PROBLEM DEFINITION:

Traditional FIR (First Information Report) registration systems suffer from inefficiencies, tampering, delays, and lack of transparency due to reliance on manual processes and centralized record-keeping. These systems are vulnerable to data manipulation, unauthorized modifications, and bureaucratic inefficiencies, leading to delayed justice and loss of crucial evidence. Victims often face challenges in registering FIRs due to corruption, reluctance of authorities, and procedural complexities. Moreover, centralized databases pose security risks, including data breaches and loss of records. To address these challenges, a secure, transparent, and efficient solution is needed to ensure tamper-proof FIR records, streamline complaint registration, and facilitate seamless tracking of cases while maintaining regulatory compliance. The implementation of blockchain technology offers a decentralized and immutable framework that enhances security, accountability, and accessibility for both citizens and law enforcement agencies.

1.1 OBJECTIVE OF PROJECT:

The objective of this project is to develop a secure and transparent FIR registration system using blockchain technology to eliminate fraud, inefficiencies, and manipulation in traditional systems. By leveraging immutable records and smart contracts, the system ensures tamper-proof complaint filing, automated verification, and real-time auditing while reducing dependency on intermediaries. Cryptographic techniques safeguard sensitive data, enhancing security and privacy. This solution modernizes the FIR registration process, ensures compliance, and fosters trust among law enforcement agencies and the public.

1.2 Scope & Limitations:

Scope:

This project focuses on developing a blockchain-based FIR registration system to enhance security, transparency, and efficiency. The system will allow secure complaint filing, real-time tracking, and authentication through immutable blockchain records and smart contracts. A user-friendly interface will be provided for complainants and law enforcement agencies.

The project scope includes:

- **Blockchain Integration:** Secure storage of FIR records using a decentralized ledger.
- **Smart Contracts:** Automating complaint registration, verification, and processing.
- **Transparency & Security:** Fraud prevention through tamper-proof records and cryptographic protection.
- **User Accessibility:** A web-based or mobile interface for users to register, track, and verify complaints.

- **AI-Driven Insights:** Crime pattern analysis and predictive law enforcement support

Limitations:

1. **Regulatory and Legal Challenges:** Adoption depends on government policies and legal frameworks, which may vary across regions.
2. **Scalability Issues:** High network congestion and blockchain transaction costs may affect efficiency.
3. **Dependence on Internet & Technology Access:** Users must have internet access and basic technical knowledge.
4. **Data Privacy Concerns:** While blockchain ensures immutability, storing sensitive details on a public ledger may raise privacy concerns.
5. **Irreversible Transactions:** Once recorded on the blockchain, modifications require additional legal mechanisms.
6. **Integration with Existing Systems:** Transitioning from traditional FIR systems to blockchain requires complex integration and data migration.

2.LITERATURE SURVEY

FIR registration plays a crucial role in the legal system, serving as the primary step in criminal investigations. A well-functioning FIR system ensures timely justice, prevents case manipulation, and enhances law enforcement efficiency. However, traditional FIR systems face several challenges, including manual delays, corruption, lack of transparency, and data manipulation, leading to mistrust and inefficiencies.

Recent research has explored blockchain technology as a potential solution to modernize FIR registration. Blockchain's decentralized, immutable, and transparent nature offers significant advantages over conventional record-keeping methods. Smart contracts and cryptographic security ensure automated, tamper-proof complaint filing and tracking.

This literature survey examines existing research on blockchain-based FIR registration, highlighting methodologies, case studies, and technological approaches. It also discusses challenges, legal considerations, and future research directions in blockchain-driven law enforcement applications. Various implementations of blockchain in legal frameworks across different countries will also be reviewed to understand the feasibility of adoption.

Several studies have explored the application of blockchain technology in law enforcement. Research by Sharma et al. (2021) discusses the use of smart contracts for automated complaint processing, reducing bureaucratic inefficiencies. Another study by Gupta and Rao (2020) highlights the benefits of decentralized FIR storage in preventing record tampering and ensuring real-time case updates. Additionally, Singh et al. (2019) analyze the legal and policy challenges associated with blockchain-based FIR systems, emphasizing the need for regulatory alignment. Case studies from Estonia and Dubai demonstrate successful blockchain implementations in public administration, reinforcing the feasibility of adopting similar approaches for FIR registration.

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3.PROPOSED METHODOLOGY

3.1 Existing System

1. Overview:

The traditional First Information Report (FIR) registration system relies on manual record-keeping and centralized databases maintained by law enforcement agencies. Citizens must visit police stations physically, and officers record complaints in written or digital formats. The process involves multiple intermediaries, making it prone to delays, data manipulation, and lack of transparency.

2. Limitations:

- **Delayed Reporting & Processing:** Victims often face bureaucratic hurdles and delays in registering FIRs, affecting timely justice.
- **Data Tampering & Corruption:** FIR records in centralized systems can be altered, misplaced, or even deleted by unauthorized personnel, leading to miscarriage of justice.
- **Lack of Transparency:** Citizens cannot easily track the status of their FIR, leading to frustration and reduced trust in the legal system.
- **Security Vulnerabilities:** Centralized servers storing FIR data are susceptible to cyberattacks, unauthorized modifications, and data breaches.
- **Limited Accessibility:** Victims often need to visit police stations physically, making the process inconvenient, especially in remote areas.

3.2 Proposed System

1. Overview:

The proposed system integrates blockchain technology to enable **tamper-proof, transparent, and decentralized FIR registration**. By utilizing **Ethereum blockchain and smart contracts**, FIR records become **immutable, verifiable, and secure**. Citizens can file FIRs digitally, track their progress, and ensure transparency in law enforcement procedures.

2. Key Features:

- **Immutable FIR Records:** Once an FIR is registered on the blockchain, it cannot be modified or deleted, ensuring data integrity.
- **Smart Contract Automation:** Automates FIR registration, approvals, and case tracking, reducing bureaucratic delays.
- **Decentralized & Transparent System:** FIR records are accessible to authorized entities, ensuring transparency and preventing manipulation.
- **User-Friendly Interface:** A digital platform for citizens, law enforcement agencies, and legal authorities to interact efficiently.

- **Secure Authentication:** Digital signatures and cryptographic verification ensure only authorized users can file or access FIRs.

3. Benefits:

- **Fraud Prevention:** Eliminates data tampering and unauthorized modifications in FIR records.
- **Efficiency & Accessibility:** Reduces paperwork, enables remote FIR registration, and speeds up the complaint resolution process.
- **Enhanced Security:** Decentralization removes single points of failure, making the system resistant to cyberattacks and data breaches.

3.3 Architecture

The architecture of the blockchain-based FIR registration system comprises several components, ensuring **security, transparency, and automation**. The key components include:

- **Blockchain Network:** Ethereum-based distributed ledger storing FIR records securely.
- **Smart Contracts:** Automating FIR filing, verification, and case updates.
- **User Interface:** A web or mobile platform for citizens and authorities to interact with the system.
- **Off-Chain Storage:** Large documents (evidence, witness statements) are stored securely using **IPFS (InterPlanetary File System)** while metadata remains on-chain.

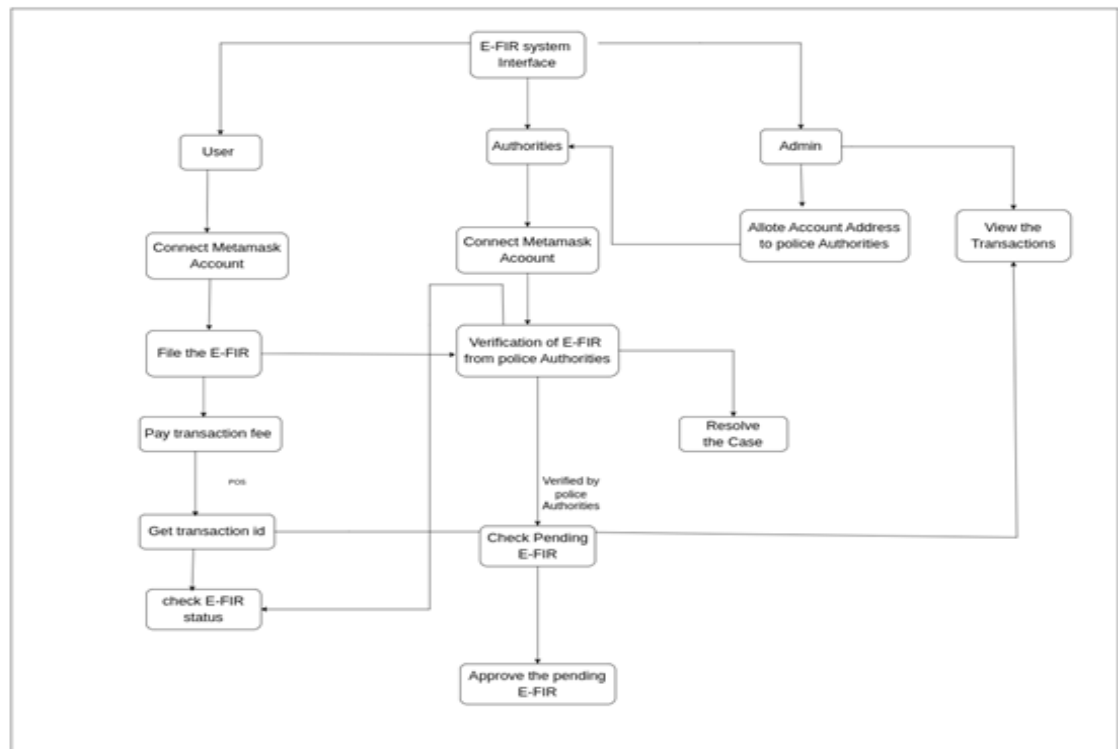


Fig. 1 System Architecture

3.5 Methods & Algorithms

Methods Used in the System:

- **Blockchain-Based Data Storage:**
 - FIR records are stored on the Ethereum blockchain as immutable entries.
 - FIR details are stored as hashes on-chain, while additional evidence files are stored off-chain using **IPFS**.
- **Smart Contract-Based FIR Registration:**
 - Citizens file FIRs through smart contracts, ensuring automated validation and timestamping.
 - Law enforcement officers receive notifications and process the FIR based on predefined rules.
- **Digital Signature & Cryptographic Verification:**
 - **Elliptic Curve Digital Signature Algorithm (ECDSA)** is used for secure identity authentication.
 - Users sign FIRs using private keys, and authenticity is verified through public keys stored on the blockchain.

Algorithms Used in the System:

- **User Authentication:** Citizens and law enforcement officials authenticate using their **digital signatures**.
- **FIR Registration:** The smart contract records the complaint details, assigns a case ID, and timestamps the entry.
- **Case Verification:** Law enforcement authorities verify the FIR details and update the case status on the blockchain.
- **Evidence Management:** Secure off-chain storage for digital evidence, with blockchain-based references ensuring integrity.
- **Case Tracking & Resolution:** The smart contract updates the FIR status as investigations progress, ensuring **real-time tracking** for victims.