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Secure Portal for Police Complaint Filing, Tracking and Management System using Blockchain Technology

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ABSTRACT: India has witnessed a concerning surge in crime rates, particularly in cybercrimes. In 2021, India reported 52,974 cybercrimes with 393.4, it increased to 445.9 per 100,000 people cases reported in 2024 alone, marking a 4% increase in crime against women from the previous year 2023. This rise in criminal activities has underscored the need for robust and innovative approaches to law enforcement and crime prevention. One such approach is the proposed blockchain-based complaint management system, which aims to address the challenges posed by underreporting and tampering of complaints.

The proposed system offers a novel solution to these challenges by enabling anonymous and authenticated online filing of complaints, eliminating the need for in-person visits to police stations. In contemporary society, a significant portion of criminal offenses remains concealed from authorities, with various factors contributing to the underreporting phenomenon. Among these reasons are concerns regarding familial reputation, a lack of trust in law enforcement agencies, the fear of reprisal or intimidation from the perpetrator, and worries about privacy breaches associated with identification disclosure. Notably, women have emerged as primary targets for cybercrimes, exploiting their perceived vulnerabilities. Recognizing these challenges, our objective is to develop a cutting-edge solution in the form of a blockchain-based complaint management system. This innovative platform facilitates the anonymous filing of cases, allows for the submission of evidence online, and ensures the secure storage of First Information Report (FIR) copies, all without necessitating physical visits to law enforcement precincts. Prior to initiating a complaint procedure, individuals undergo a stringent authentication process, effectively thwarting attempts at lodging fraudulent claims. By leveraging the immutability of blockchain technology, all entries are meticulously recorded within an unalterable database, thereby eliminating the possibility of tampering with FIRs and fostering a greater degree of accountability within the criminal justice framework. Our proposed decentralized blockchain application provides a secure and efficient means of storing digital FIR copies, ensuring their integrity and accessibility while safeguarding the anonymity and privacy of individuals. This project abstract underscores our commitment to leveraging advanced technological solutions to address longstanding challenges in crime reporting and justice administration.

By leveraging blockchain technology, the system not only revolutionizes the complaint management process but also establishes a decentralized platform that enhances the integrity and immutability of complaint records. This, in turn, bolsters the evidentiary value of complaints, making it easier for law enforcement agencies to investigate and prosecute criminal activities.

KEYWORDS: Real-time Monitoring, Blockchain Integration, Smart Contracts, Audit Trail, Data Privacy, Confidentiality, Access Controls, Decentralized.

I. INTRODUCTION

In India, the reporting of offenses is a crucial aspect of law enforcement. Crimes are classified into two main categories: cognizable offenses and non-cognizable offenses. Cognizable offenses encompass serious crimes such as murder, theft, kidnapping, and rape. In such cases, authorities have the power to detain suspects without a warrant. Victims or witnesses can file a First Information Report (FIR) at the police station, detailing the incident's specifics, including the victim's identity, the time and location of the offense. Subsequently, police inspectors can commence investigations without the need for court orders. On the other hand, non-cognizable offenses include crimes like forgery

and cheating. Unlike cognizable offenses, police officers cannot make arrests for non-cognizable offenses without a warrant from a magistrate. However, the traditional pen-and-paper-based system of policing in India presents several challenges, including politicization, corruption, and inefficient handling of cases. Recognizing the need for a transition to e-governance, we proposed a shift to online-based administration to address these shortcomings.

Our envisioned system aims to conduct the majority of police procedures online, minimizing opportunities for unethical conduct. By reducing political interference and official pressure on sensitive cases, our approach mitigates corruption within law enforcement. Complaints are seamlessly converted into FIRs, securely stored on a blockchain ledger to prevent tampering. This blockchain-based storage ensures the integrity and security of case-related documents, eliminating the risk of alteration or theft that exists with offline storage methods.

Moreover, our system facilitates the reporting process for victims, ensuring their privacy and providing necessary support, particularly in cases of sexual harassment where women police officers often play a crucial role. Victims are kept informed of case developments, and perpetrators are held accountable for their actions through appropriate legal measures. By leveraging technology to streamline law enforcement procedures and enhance transparency, our initiative aims to improve the efficacy and integrity of the criminal justice system in India.

Our proposed system will be providing a greater facility to file and track a complaint securely as a decentralized manner without any leakage to the data to the outsiders who has no linkage to that complaint and FIR if filed also, that particular FIR is only visible to the person who filed the complaint. It provides greater security for the digital complaint.

II. LITERATURE REVIEW

[1] Ishwarlal Hingorani, Rushabh Khara, Deepika Pomendkar and Nataasha Raul in 2020 proposed a police complaint management system that utilizes blockchain technology for enhanced registration, tracking, and management of complaints. It employs a 16-bit AES encryption algorithm to secure the details and utilizes the Diffie Hellman key exchange technique for exchanging secret keys. The system includes user-side and police-side interfaces distributed via web and mobile interfaces. It aims to create a decentralized platform by leveraging technologies like blockchain and IPFS for processing complaints securely and efficiently.

[2] Nasir D. Khan, Chrysostomos Chrysostomou (2020), Smart cities leverage Information and Communication Technologies (ICT) to enhance citizens' quality of life, addressing economic growth, governance, resource management, and mobility while ensuring security and privacy. The paper introduces a blockchain-enabled framework for Electronic First Information Report (e-FIR) data management in a smart city police station, addressing concerns like false registration and data integrity. The proposed solution aims to minimize these issues and represents a pioneering effort in using blockchain for e-FIR in a smart city context.

[3] Lynsha Helena Pratheeba HP, Bharath D R, Cibiya N E, Dheekshitha S, Divya M N: In response to escalating crime rates and outdated complaint management, our paper proposes an advanced, secure police complaint system. Utilizing blockchain, our solution ensures decentralized integrity, mitigating tampering risks. Through encryption and blockchain hashing, authenticity and timestamping are guaranteed, eliminating reliance on manual processes. The decentralized nature fosters resilience, eradicating single points of failure and addressing challenges in police complaint management for a transparent law enforcement ecosystem.

[4] Antra Gupta, Deepa. V. Jose(2019) , proposes a secure FIR. system using blockchain technology. The proposed system eliminates the need for trust in the police by the general public. The system has four stakeholders i.e. complainant, witness, investigating officer, and the suspect. The decentralized solution will enable the relevant stakeholders to keep a track of each and every activity and protect the digital FIR. from any malfeasance.

[5] Lynsha Helena Pratheeba, Bharath D, Cibiya N, Divya M, Dheekshitha S (2023) , In light of increasing criminal activities and outdated complaint management practices, our study advocates for an advanced and secure police complaint system. Introducing an innovative blockchain-based solution, our approach ensures the decentralized integrity and immutability of records, thereby reducing the risks associated with tampering. By implementing encryption and blockchain hashing techniques, our system guarantees the genuineness and timestamping of filed complaints, eliminating the dependence on obsolete manual procedures. The decentralized architecture eliminates vulnerabilities related to single points of failure, enhancing resilience and trust. This research presents a revolutionary

remedy, effectively addressing the existing challenges in police complaint management and fostering transparency in the law enforcement ecosystem.

[6] Md. Mijanur Rahman, Md. Moshikul Azam, Faria Sanjida Chowdhury (2022) , Workplace harassment is a global concern, impeded by victims' identity exposure fears. A proposed blockchain system aims to enhance complaint management through decentralized and tamper-proof features. Objectives include creating a secure platform with options for anonymous or disclosed complaints. The research question delves into how blockchain properties support workplace harassment procedures.

[7] Ram Kolhe, Sanskriti Singh, Nazam Ansari, Janhavi Karande, Hemantraaj Bharve, Janhvi Dubey (2023) , The proposed framework is digitalized and Android based. The system will replace the traditional system of traffic police operation. In "TRAFFIC SMART FIR SYSTEM", we designed an electronic program that helps the traffic police to obtain legal wages on traffic violations through the use of Android platform. Traffic management is a serious issue confronted by the city. Since the proposed framework is digitalized and android based, It will serve as handier instrument and helpful option implies for traffic.

[8] Bharath Kumar V, Dr. Mir Aadil (2023) , proposes a secure FIR. system using blockchain technology. The proposed system eliminates the need for trust in the police by the general public. The system has four stakeholders i.e. complainant, witness, investigating officer, and the suspect. The decentralized solution will enable the relevant stakeholders to keep a track of each and every activity and protect the digital FIR. from any malfeasance.

[9] Pattamaporn Kormpho, Panida Liawsomboon, Narut Phongoen, Siripen Pongpaichet (2018) , talks about a system for customers to file a complaint against the company if they are dissatisfied with the product bought. It is a mobile app where the user can file the complaint through a chatbot and the system submits the complaint to the respective department using classification.

[10] Shreyas Shedge, Pratik Wadkar, Atreya Raorane, and Bushra Shaikh (2021) , The portal is a web-based platform prioritizing digital customer service and complaint resolution based on severity. Effective communication is emphasized to prevent poor organizational services. Implemented with an AI-driven logging system, the portal aims to strengthen citizen-government ties through efficient and prioritized complaint resolution.

[11] Maisha Afrida Tasni, Abdullah Al Omar, Mohammad Shahriar Rahman, and Md. Zakirul Alam Bhuiyan (2021) , proposes a blockchain-based decentralized system to store any kind of criminal records. Storing records in the blockchain would remove any possibilities of the criminal records being changed against the law. The criminal data is encrypted and stored in the blockchain and access to access them is only given to designated authorities. Any alterations are stored in the blockchain with the information of the person changing it.

[12] Archana Iyer, Prachi Kathale, Sagar Gathoo and Nikhil Surpam in 2016 proposed an e-police system that comprises an Android mobile application and a website for the police department. Complainants can upload records such as photos, audio files, and videos. Police officers can access these documents through an online portal, verify the information. The system is built using technologies like the Android SDK, MySQL database, Eclipse IDE and WAMP server. advantages such as time and energy savings, public accessibility, and a secure and transparent inquiry and tracking process.

[13] Kahkashan Tabassum, Hadii Shaiba, Saada Shamrani and Sheikha Otaibi in 2018 proposed an online tool used by citizens and the Riyadh city police to report and handle crime-related concerns. The system aims to provide swift and efficient responses to crimes and illicit acts. Citizens can communicate with the police online through the system. It includes entities such as officers, administrators, complaints, feedback, criminals, and citizens. The complaint data is accessible to complainants, police officers, and administrative officials. The system is developed using PHP for the web interface, CSS for the user interface, and MySQL for the database.

[14] Mollah, Muhammad Islam, Sikder Aman Ullah, Engr. Mohammad. (2012) , for the enhancement of e-governance in Bangladesh, they have proposed an e-police system. Along with it, they aim to improve their country's police administration by suggesting an interactive website that contains information such as daily press releases as well as maintaining a database of top criminals in the country, people under police custody, etc

III. METHODOLOGY OF PROPOSED SYSTEM

The system which is proposed is a decentralized application for managing complaints with the help of various technologies like blockchain for security. The detailed architecture of the system is explained in the form of modules followed by the implementation of the system.

The proposed system addresses the limitations of traditional complaint filing processes prevalent in the past. Historically, lodging a police complaint necessitated a physical visit to the police station, involving cumbersome paperwork. Furthermore, the issuance of First Information Reports (FIRs) also relied on tangible, paper-based documentation. However, this conventional approach posed security concerns and accessibility challenges, particularly for sensitive cases involving family reputation or instances of sexual harassment, especially affecting women. To mitigate these issues and ensure the digital preservation of documents securely, we propose a decentralized application leveraging blockchain technology. This innovative solution enables individuals to file complaints remotely from anywhere, eliminating the need for physical presence at police stations. By storing complaint and FIR copies securely on a blockchain ledger, the system ensures data integrity and confidentiality while providing accessibility and convenience to users.

FUNCTIONING OF THE SYSTEM:

The proposed application comprises two distinct modules: User and Admin. In the User module, individuals are required to register and log in using a valid government-issued ID, such as Aadhaar. Upon successful authentication, users gain access to the user home interface. Here, they can submit complaints via a designated form, providing accompanying evidence. The application involved securely storing the complaint in blockchain with hash values. Additionally, users can view a personalized page showcasing their submitted complaints, complete with pertinent details like descriptions, proofs, and the current status of each case, categorized as Accepted/Rejected and Resolved/Unresolved. If an FIR has been filed, users can access it from this interface. He can track the status of the complaint filed actively. In the Admin module, accessible via a login mechanism utilizing the Private Address of a blockchain wallet, admins are presented with a dashboard displaying all received complaints, along with the associated evidence stored in IPFS (Inter Planetary File System).

Admins possess the authority to manually examine and either accept or reject each case. In the event of acceptance, the admin can proceed to resolve the case by providing a summary of the investigation and uploading the FIR copy, which is securely stored in IPFS and linked to the corresponding complaint ID. Notably, access to the uploaded FIR copy is restricted solely to the victim who filed the complaint, ensuring privacy and confidentiality. Importantly, the application ensures real-time data updates, ensuring that any changes made by the admin are promptly reflected in both the admin and user modules, without any delays.

SYSTEM ARCHITECTURE

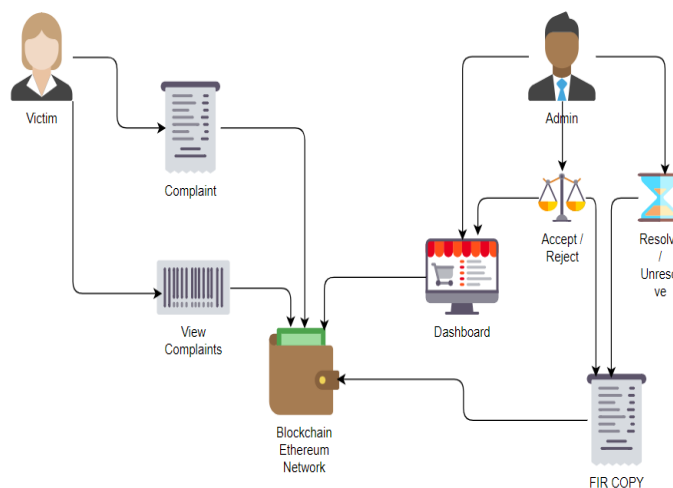


Figure 1: system architecture Layered Architecture for Secure Complaint Filing and Management System"

The Secure Complaint Filing, Tracking, and Management System utilizes a layered architecture for robustness and efficiency. At the user interface layer, users access features like complaint submission and tracking. The application layer handles business logic and interacts with the blockchain network for secure data recording. Data management ensures secure storage and retrieval using encryption techniques. Security measures, including access controls and audits, safeguard against threats. Integration with external systems is facilitated for seamless interaction. Compliance is enforced through audit trails and reporting capabilities. Scalability and performance optimization ensure system responsiveness under high demand. Overall, the system provides a secure, transparent, and efficient platform for complaint handling while meeting regulatory requirements.

IV. RESULTS

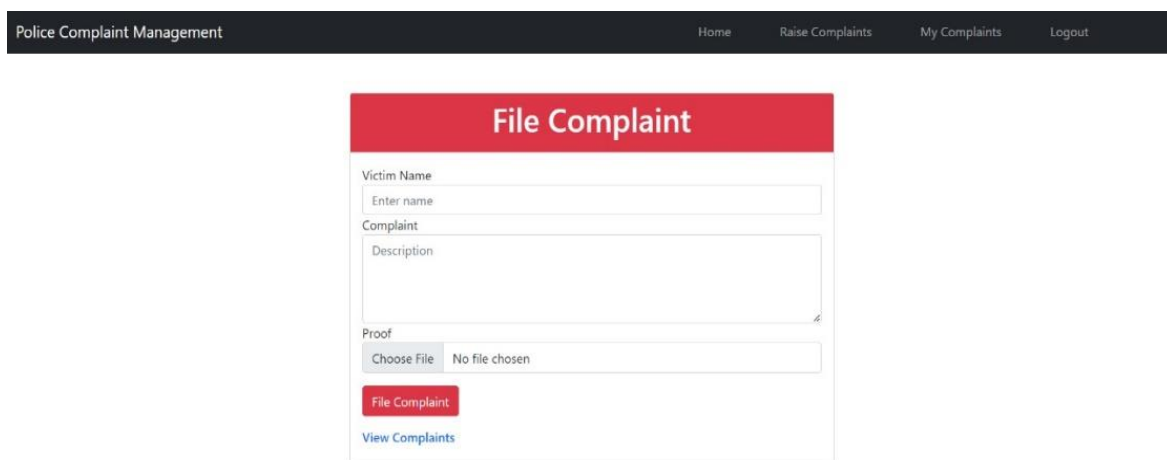


Figure 2: File Complaint page for Secure Complaint Filing and Management System

After Registration / login a user can able to get the chance to file a complaint in File Complaint Page as shown in the fig.2.

The "File Complaint" page (from fig 2) serves as the central hub for initiating complaints within the Secure Complaint Filing, Tracking, and Management System using Blockchain Technology. It offers a user-friendly interface where victims can input essential details, including their name, a comprehensive description of the complaint, and any supporting evidence. The "Victim Name" field ensures proper identification, while the "Complaint" text area allows for detailed articulation of grievances. Users can also attach supporting evidence through the "Proof" section, whether it be files, images, or links. Once all necessary information is provided, clicking the "File Complaint" button initiates the secure submission process, encrypting and recording the complaint data on the blockchain. Additionally, the inclusion of a "View Complaints" link allows users to access previously filed complaints, promoting transparency and enabling tracking of complaint progress. Through these features, the "File Complaint" page facilitates seamless and secure complaint submission, enhancing transparency and accountability in the system's complaint management processes.

The list of Complaints filed by Jagadeeswara Reddy

Raise Complaint

S. No.	Complaint ID	Description	Proofs Submitted	Status	FIR copy
1	1	I got robbed in the market, the theifs grabbed my wallet	View Proofs	Accepted, Resolved	View FIR Copy
2	2	Robbery Case	View Proofs	Rejected, Un-resolved	NOT APPLICABLE

Figure 3: List of Complaints Filed for Secure Complaint Filing and Management System.

The List of Complaints Filed page (from fig.3) is a pivotal component within the Secure Complaint Filing, Tracking, and Management System using Blockchain Technology. Serving as a centralized repository, this page offers users, including administrators and authorized personnel, a comprehensive overview of all complaints lodged within the system. Each complaint is assigned a unique identifier, facilitating traceability and efficient referencing during tracking and resolution processes. A succinct description of each complaint provides users with a quick understanding of the nature of the grievance without the need for detailed examination. The presence of the "Proofs Submitted" column indicates whether supporting evidence or documentation has been provided alongside each complaint, aiding in assessing the completeness of complaint files. The "Status" column offers real-time updates on the progress of each complaint, enabling users to monitor its journey through the complaint handling process. Additionally, if applicable, the "FIR Copy" column provides access to the First Information Report associated with the complaint, offering users valuable context and additional information. Through the secure storage and tamper-proof nature of blockchain technology, the integrity and transparency of complaint data are ensured, fostering accountability and trust within the system. Access controls are implemented to safeguard sensitive information and ensure that only authorized personnel can view complaint details, further enhancing security and confidentiality.

The list of Complaints Recieved

S.No	Complaint ID	Description	Proofs Submitted	Status	FIR copy
1	1	I got robbed in the market, the theifs grabbed my wallet	View Proofs	Approved	FIR Copy
2	2	Robbery Case	View Proofs	Rejected	Not Applicable
3	3	chain snatching case	View Proofs	Accept Reject	FIR RESOLVE

Figure 4: The List of Complaints Received for Secure Complaint Filing and Management System.

From figure 4, The "List of Complaints Received" page offers a comprehensive overview of all complaints lodged within the Secure Complaint Filing, Tracking, and Management System using Blockchain Technology. This interface presents key details for each complaint in a structured format, facilitating efficient tracking and management. The "Complaint ID" column provides a unique identifier for reference, aiding in the quick identification and retrieval of specific complaints. Users can review the "Description" column to gain insight into the nature of each complaint, while the "Proofs Submitted" column displays information regarding any accompanying evidence or documentation. The "Status" column indicates the current stage of processing for each complaint, providing transparency and allowing stakeholders to monitor progress. Additionally, users have the option to access the First Information Report (FIR) associated with individual complaints through the "FIR Copy" column, if applicable. By centralizing complaint information and leveraging blockchain technology for data integrity, this page enhances transparency, accountability, and efficiency in complaint management processes.



Figure 5 : Resolve FIR status for Secure Complaint Filing and Management System.

From figure 5, The "Resolve FIR Status" page stands as a pivotal feature within the Secure Complaint Filing, Tracking, and Management System using Blockchain Technology. This interface provides authorized personnel with a streamlined platform to update the status of registered complaints, particularly those concerning First Information Reports (FIRs). Users are prompted to input the unique identifier associated with the complaint, ensuring precise identification for resolution. Through the selection options of "Resolved or Partially Resolved," users can accurately indicate the current status of the complaint, distinguishing between fully resolved and partially resolved cases. Upon inputting the necessary details, clicking the "Submit" button initiates the secure recording of the status change onto the blockchain. By leveraging blockchain technology, the system maintains an immutable record of status updates, ensuring transparency and accountability throughout the complaint resolution process. This intuitive interface not only facilitates efficient status updates but also enhances stakeholders' trust in the system's reliability and effectiveness.

V. CONCLUSION

In conclusion, the proposed system presents a comprehensive solution to the inefficiencies and security concerns inherent in traditional complaint filing processes. By leveraging blockchain technology, the system facilitates remote complaint submission, securely stores documents including FIRs, and ensures data integrity and confidentiality. The user-friendly interface and real-time updates enhance accessibility and streamline case management for both users and administrators. Overall, the system represents a significant advancement in law enforcement technology, promising greater efficiency, transparency, and accountability in handling complaints.

VI. FUTURE ENHANCEMENTS

In future iterations, we envision integrating artificial intelligence (AI) technology to further enhance the system's capabilities. Specifically, AI algorithms can be employed to evaluate police complaints filed by victims, providing observational insights to aid police officers in their investigations. This integration of AI aims to improve the efficiency

and effectiveness of law enforcement processes, ultimately leading to better outcomes for victims and increased public trust in the justice system

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