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# Implementation of Blockchain for Police Complaint Management

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**A B S T R A C T**

This study examines the viability and potential advantages of developing a police complaint management system utilizing blockchain technology. This system can provide a public, secure, and auditable record of complaints while simultaneously protecting the privacy of the complainants by utilizing the immutable and decentralized characteristics of blockchain. This paper demonstrates the potential of blockchain technology to improve the accountability and effectiveness of law enforcement agencies, thereby promoting public trust and confidence in the justice system. It does this through a thorough review of the existing literature and a case study of real-world implementation.

**Keywords:** Blockchain, Cryptography, Cipher, FIR, Decentralized, Immutable, Elliptic Curve Cryptography, CDRs, Waterfall Model.

## 1. Introduction

The administration of police complaints is only one area in which blockchain technology has the potential to transform our way of life. The current system for submitting and handling complaints is frequently cumbersome, bureaucratic, and opaque. By offering a safe and open platform for reporting complaints, tracking their progress, and assuring a just and speedy resolution, a blockchain-based management system could address these problems.

The potential advantages of adopting blockchain technology to handle police complaints, including improved openness, accountability, and efficiency, will be examined in this study paper. The technical aspects of creating such a system will also be covered, including the usage of smart contracts, consensus methods, and data encryption.

## 2. Literature Review

### *2.1 Police Complaint Management System using Blockchain Technology.*

The sections about the suspect, police, and complaint are all included in this paper's project. The bottleneck issue was resolved using a public blockchain system, and transactions are broadcast to every node. In their system, they have utilized a 16-bit AES algorithm to encryption to secure the details and they are utilizing the Diffie Hellman key exchange technique is used to exchange secret keys [1].

The user-side interface and police-side interface were established, and the build module is distributed via the web and mobile interfaces. And the proposed system is a decentralized platform, and it is processing complaints with the help of various technologies like blockchain, IPFS, etc.

They are making use of the proof-of-work-based public Ethereum network. Ethereum guarantees the privacy of sensitive data and offers encryption transparency. An unchangeable ledger is created using the concepts of smart contracts, and no network participant can edit it. Using the afore mentioned techniques, all complaints are encrypted, and the user-provided proof is saved on the open IPFS network. Due to the transparency offered by Ethereum, all network users may see that a complaint has been filed on the blockchain. The reports and crime data here can only be accessed by authenticated police officers or admin. All the files in this system, including FIR, NCR, and charge sheets, are transformed into pdf files, and encrypted using security modules.

### *2.2 E-Police System- FIR Registration and Tracking through Android Application.*

The system that the authors of this study proposed includes a front end for an Android mobile application and a website for the police department. It comprises two types of complaints and the complainant. The complainant is the one who files the complaint by completing the FIR form. The complaint is permitted to upload records that include photos, audio files, and videos. Through an online portal, police officers can view these documents. They will confirm the information and conduct additional research [2].

This method increases security because the FIR ID can only be accessed by investigators and the data is kept private and confidential. The Android SDK, which provides users with access to the Android API through the Java language, the Eclipse IDE, MySQL for creating databases, and the WAMP server

are among the technologies on which this system is based. This method provides a number of benefits over the current manual system, including time and energy savings, public accessibility, and a safe and open inquiry and tracking process. Also, it aids in raising the bar for the Indian police force.

### *2.3 CRAB: Blockchain Based Criminal Record Management System.*

The authors of this research presented a criminal record storage system that makes use of blockchain technology to achieve integrity and security. Different government law enforcement organizations use separate databases, which creates a barrier to the free flow of information between them. By storing the data in the cloud and maintaining the transaction log and provenance data in the blockchain, one of the goals of this system is to ensure that evidentiary information is not altered while the case is being heard in court [3].

This platform employs the Elliptic Curve Cryptography (ECC) encryption algorithm to encrypt criminal data. They built a Smart Provenance system on the existing Ethereum system which makes use of smart contracts. These are used to store the metadata of a file and include an event log.

According to the CRAB Protocol, Parties must be pre-registered in this system before engaging in any transactions. The system will ignore any data transmission from parties who are not registered. Each data sender is solely responsible for the contents of the data. The system's goal of security is advanced by encryption. Since no two files can share the same encryption key, the risk of attacks is drastically decreased by the randomly generated encryption keys.

### *2.4 Proposed E-Police System for Enhancement of E-Government Services of Bangladesh*

According to the authors of this publication, Police officers can use this technology to retrieve information, report incidents, accidents, and crimes committed while driving, and do so while using live visuals and photos. The public is given free access to this system so they can upload any questions or complaints. It includes separate databases on people in the public and law enforcement. The goal of this system is to maintain Bangladesh's current state, and the police-to-population ratio, and to make Bangladesh a safe place to live and work. Society is safeguarded and defended by this system against those who disregard the rules and laws of the state [4].

It consists of two components: 1) Local police stations, special units, detective divisions, jails, and traffic systems use MAN and WAN topologies. 2) Home security is connected with the district police, intelligent software, a government website, and an electronic database. Security is provided by the fact that the district police's common database cannot be changed.

This system provides several benefits:

1) Citizens have free access to the e-police system. 2) The system is hard to hack or access unlawfully because all police stations and their branches are connected via WAN, which offers secure data communication. 3) offers security and safety.

### *2.5 e-Cops: An Online Crime Reporting and Management System for Riyadh City.*

It is an online tool used by citizens and Riyadh city police to report and handle concerns. In a short amount of time, this system can offer better answers to crime and other illicit acts. The public can communicate with police on the internet by using this technology. It includes entities such as Officers, Administrators, Complaints, Feedback, Criminals, and citizens [5].

Once the complaint has been registered the saved data can be examined by the complainant, police officials, and other administrative officials. Both users and police officers must log in using the proper credentials to access this online application. The information that the complaint has supplied is accessible to and can be viewed by police officers. Also, they get access to information on the most sought criminals by the department.

This program was created using PHP, which has five implementation stages. They are 1) Interface implementation and 2) Implementation on the server-side 3) Implementation on the client side 4) Implementation of authentication 5) establishment of a database. In the creation of this application, HTML for the web interface and CSS for the user interface both play significant roles. The building of databases uses MySQL.

### *2.6 A Simple Implementation of Criminal Investigation using Call Data Records (CDRs) through Big Data Technology.*

In this paper, they used call data records (CDRs) from a range of suspects and victims to glean crucial information for the investigation of the crime. They used Hive to do Data Summarization, Query, and Analysis on the Structured CDR and Hadoop to process and store the massive CDRs. The report provided by this system includes users who are frequently called and have a maximum length, which will aid the authorities in their subsequent inquiry. Also, it will show callers whose IMEI numbers are constantly changing, indicating suspicious activity. The anti-crime team may swiftly assemble and tie the assessments of the evidence to the facts highlighted by the report with the aid of these data [6].

They utilized the TreeMap data structure in java to keep the order and the MapReduce algorithm to list the frequent callers based on the frequency of each unique number. They also stored the list as a key-value pair to preserve uniqueness.

### *2.7 Online Fir Filing System*

This system's goal is to develop an Android application that enables train passengers to report crimes by filing an FIR. The criminality that occurs in trains is tied to this system. In an emergency, a GRP person has access to the FIR and can assist the passenger. The government railway police and passengers can both benefit from this application. The victim's database is kept up to date by this application, which is useful for additional research. This system includes a web portal for the police department as well as a front end for users. Public and admin portals are both present. The admin portal is under government control. The security of user data is this system's primary concern. This application provides travellers or passengers with quick services. It also helps the authorities to undertake effective investigations thereby minimizing crimes [7].

### *2.8 Research on Online Crime Server and Management*

The authors suggested a computer-based system that will readily satisfy the needs of police stations and provide the answer to the issues they encounter. Both users and the administrative staff at the police stations will benefit from it. This system offers an application that is simple to use and is designed to keep records about prisoners. Administrators can add prisoner information and log users in as users. Every FIR is given a unique ID as required by this system, and the prisoner number will be unique as well [8].

This system notifies us of any crimes committed, any police complaints or FIRs filed, and any criminal captures so that we may update the case's information. The PHP and MySQL programming languages were used to create this web-based application. The Crime Management System's goal is to create a web-based application that will allow users to report crimes online.

The three main modules are administrator, user, and visitor. The functional needs in the user entity were properly addressed by this system. The user can add convicts, write an FIR, and add and delete complaints.

### *2.9 Impact of Crime Reporting System to Enhance Effectiveness of Police Service*

By sorting the criminal data, this technology finds crimes. It demonstrates a stronger concern for security and privacy. This system was created for iOS and Android. Users have the option to report crimes such as rape cases, road traffic infractions, stabbings, murders, accidents, robberies, and more. Also, this system offers data security and privacy. The data is stored in the cloud after the information is sorted appropriately. Police officers can easily and quickly retrieve data due to the high level of protection [9].

Police officers can conduct further inquiries once they have obtained the material from cloud storage. This system's one drawback is the false reporting of crimes that cannot be solved.

### *2.10 Criminal-Alert App*

The authors of this research developed the Android software "Criminal-Alert" for law enforcement purposes. This program enables users to report incidents or concerns that occur nearby. This application's primary goal is to prevent manually maintained complaints and histories. These suggested systems' core functions include reporting crimes, monitoring developments, collecting evidence, and looking for missing people and assets. It is entirely secure and private to register.

This application claims that a system design paradigm known as the "Waterfall model" exists. This model comprises the processes of requirement analysis, testing, system analysis, implementation, and maintenance. It also incorporates brainstorming and planning.

A server machine is initially deployed, and it may be accessed by all clients and connected to all devices. The principal participants in the system are the users who submit complaints, the administrators who view complaints and report on all tasks, and the department, which is responsible for identifying offenders and punishing them in line with the law.

## 3. Conclusion

In conclusion, implementing a blockchain-based system for managing police complaints can significantly improve the process of transparency, security, and effectiveness. This system can offer a tamper-proof and auditable record of complaints by utilizing the immutable and decentralized characteristics of blockchain, which can promote confidence between law enforcement organizations and the people they serve. Ultimately, this study emphasizes how blockchain technology has the potential to increase law enforcement's effectiveness and accountability.

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