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# Secure FIR System using Blockchain

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**Abstract:** *Whether directly or indirectly, technology has been used for every imaginable endeavour. Technology is used in many different industries, including business, agriculture, law enforcement, governmental workstations, and more. Given the rise in crime rates, it is more important than ever to hold the culprit accountable and ensure that the victim receives justice. Sadly, things don't always turn out this way. The e-FIR data is initially stored locally in the central database of a police station, which is later shared with the head office (HQ) of police stations. However, because the police station has local control over the e-FIR database, it is easy to modify the e-FIR data; It is possible to create a mechanism to prevent this. The integrity of the e-FIR data, phone registration, and non-registration are the key issues with the conventional approach. A system like this would provide the population with access to one that is free of corruption because inefficiency, corruption, and a lack of transparency are the sources of these problems. By employing blockchain, an effort has been made to safeguard the integrity of e-FIR data and prevent fraudulent registration*

**Keywords:** Blockchain Technology ,Encryption, SHA 256, Message Digest

## I. INTRODUCTION

Technologies of information and communication (ICT) are essential to the idea of smart cities. ICT contributes to human social life by fostering economic growth, enduring good governance, prudent resource management, and effective mobility, all while protecting citizens' security and privacy. This improves citizens' quality of life. There should be a smart and safe framework for managing Electronic First Information Report (e-FIR) data in a police station in a city where smart automobiles, smart utilities, smart schools, and so forth are all connected to the Internet to exchange vast volumes of data on a daily basis. With documents getting bigger, it's more important than ever to keep correct records and disseminate information.

Similarly, across borders to protect national security The process will go more smoothly if you have reliable, time-stamped records. Understanding the nuances of crime classification is essential for protecting national security. Cognizable Offenses - These are crimes that may be recognised within national boundaries. The process will go more smoothly if you have reliable, time-stamped records. Knowing the specifics of the classification of offences is key. Police can confiscate property associated with serious felonies that are cognizable without a warrant. Murder, robbery, the killing of a Dowary, kidnapping, and other crimes are among them. . Less serious offences that the police cannot be held liable for without a warrant include non-cognizable offences. Only a few examples include assault, dishonesty, and forgery. While any form of offence may be the subject of a lawsuit, only offences that are subject to legal punishment are the subjects of a FIR. Criminal records are one of the most delicate types of public data. The rigidity and dependability of papers can be protected by including criminal records into a blockchain, which frequently helps to keep data secure from hackers. This paper proposes a data integrity-preserving, blockchain-based method for handling criminal records.

## II. LITERATURE SURVEY

[1]Companies can automate business procedures like asset lifecycle management and supply-chain management thanks to a new platform called blockchains (SCM). The internet of things (IoT) can provide crucial inputs for these processes, including meteorological data and details on the status of shipments, as well as GPS coordinates or sensor readings for temperature, humidity, pressure, mechanical shock (impact), and vibrations. For instance, a blockchain-

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based SCM system can be used to do cold-chain monitoring by allowing a shipping container's temperature sensor to provide frequent reports of its observations. [2]A unique cross-border cybercrime detection system is created by fusing the PSE theory with the concept of big data analysis in order to accelerate the detection of cybercrime globally. The hardware operating environment of the cross-border network crime detection system is created by coupling the U-boot network development board and the OpenStack criminal information detecting component in the TFTP server. The cross-border network crime detection system based on PSE and big data analysis is designed with the basis for hardware implementation by analysing the characteristics of detection information, calculating the cross-border network detection domain, and directional planning of network crime information. [3]Major concerns about security issues are being expressed as a result of the rising crime rate and criminal population. Police agencies strive to stop and identify crime before it happens. Newer innovations, including CCTV, are frequently used in both public and private settings to reduce crime, but they still require human oversight. For a person, controlling many screens at once is challenging. It causes a number of mistakes. We proposed our Real-Time Crime Detection Method as a potential solution to these issues. It monitors real-time recordings, notifies the neighborhood's cybercrime administrator when a crime happens, and also relays the location of the offender. [4]The development and application of innovative data mining tools for crime research can play a crucial role in averting future harm and aiding in crime prevention given the fast-paced nature of modern police work. This essay seeks to address the issue of identifying potential recurring offending tendencies by utilising previously underutilised elements from police-recorded crime data. This is accomplished by suggesting a crime data processing method that extracts the three variables time, setting, and modus operandi from police-recorded crime event data. The Apriori algorithm, which is often employed for frequent item set mining and association rule learning from big datasets, is utilised to model each crime-event characteristic. [5]Criminal detection issues can be modelled using data mining. Along with being a social irritation, crimes have a high financial impact on our society. Any investigation that speeds up the criminal justice system will be successful. 50% of crimes are committed by 10% of offenders. Here, we examine how the identification of crime patterns might be used to accelerate the criminal investigation process using a data mining approach called clustering. To help discover crime patterns, we'll take a closer look into k-means clustering with a few tweaks. [6]This paper creates a framework for network-based criminal information retrieval based on face image identification. Cybercrime detection is much more difficult than traditional crime detection due to the sophistication and professionalism of criminal techniques, the variety of criminal tactics, and the high level of crime concealment. This makes it extremely difficult to study the case, which reduces the chance that it will be discovered.An effective criminal data modelling system is created using the face analytic model. In order to express the coefficients of samples for related types that are as similar as feasible, the regular term of the ideal coding coefficient matrix is introduced. [7]The operation of the ANC controller and the modelling of the secondary route are mutually reliant and interactive in the present traditional online secondary path modelling techniques. Therefore, the system's performance may be negatively impacted by the mutually undesired disturbances. An innovative online secondary path identification algorithm based on FIR filters is suggested in the current paper. The method differs from current algorithms in that it does not require adding further noise to the secondary source, and it also differs from general modelling techniques that use control output.Instead, the fact that the coefficient vectors of FIR filters are equivalent to impulse responses corresponding to transfer functions and that when the control filter's coefficients are updated, the filter coefficient vectors differ at different iteration steps due to estimation errors is used. Additionally, the reference signal is used as the input for the system identification, and the modelling of the secondary path is relatively independent of the active noise reduction system in the technique. As a result, the mutually harmful disturbances between the identification of the secondary path and the operation of the ANC are totally avoided, and the complexity of the ANC system is significantly decreased. Finally, computer simulations demonstrate the viability of the suggested approach and demonstrate how quickly it can follow the change of secondary path. [8] Two algorithms are used in this paper to create the FIR filter. When implementing the FIR Filter, we take into account the filter order and sparsity. The l0-norm minimization, which can be applied by two alternative techniques, solves the problem identification. The upper limit value is taken into account in the first design method, which results in a weighted l 0 -norm minimization issue. In the second design approach, the problem is changed into another weighted l 0 -norm minimization. The IRLS algorithm can be used to solve the weighted l 0 -norm minimization problem. The optimum FIR filter design uses both the sparsity and filter order design approaches.

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We may create a multiplierless FIR filter to accomplish the reduced hardware design from this reduced coefficient set. [9]In this study, a technique for creating smooth trajectories is proposed. In earlier research, low computing cost acceleration-limited trajectory was converted into jerk-limited trajectory using a finite impulse response (FIR) filter. FIR filtering, on the other hand, lengthens the period of acceleration, causing the trajectory to veer off course. A innovative way to make the trajectory approach the final point without overshooting is suggested as a solution to the issue. The suggested method can provide a smooth and almost time-optimal trajectory starting from a state with appropriate initial velocity and acceleration and deliver a new possible route in real-time. [10]We provide an online Khmer recognition technique that depends on the handwriting motion's time-frequency properties. Barycenter trajectory and pen-tip movement velocity are two characteristics that can be used to describe the handwriting motion. Then, to extract the time-frequency features of the handwriting motion, the barycenter trajectory and its velocity of the pen-tip movement are expanded into wavelet series. Following that, the FIR (finite impulse response) Wiener filter can be used to lessen the fluctuation of the wavelet coefficients. Additionally, the wavelet coefficients of the velocity and trajectory of the barycenter with reduced fluctuation are used as the input and output of the FIR system, respectively, to characterise the time-frequency features of the handwriting motion.We provide an online Khmer recognition technique that depends on the handwriting motion's time-frequency properties. Barycenter trajectory and pen-tip movement velocity are two characteristics that can be used to describe the handwriting motion. 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The suggested method can produce various jerk profile forms, including time-optimal and fixed-time jerk-limited trajectories, starting with a fresh setpoint, such as an event provided by external sensors, and an arbitrary state of motion, i.e. with non-zero beginning velocity and acceleration values. The motion can instantly take into account a new specification of the velocity, acceleration, and jerk kinematic limitations.A multi-DOF system may be readily controlled during one control cycle, which is typically about one millisecond, because to the extremely fast calculation time (less than one microsecond), freeing up time for additional computer work. On the brand-new 7-DOF industrial robot KUKA LWR iiwa, the algorithm is experimentally evaluated. [12]When a cognizable offence like murder, abduction, rape, theft, etc. is committed, a victim or someone acting on their behalf must submit an electronic first information report (e-FIR) to the police station. Due to the centralised nature of the e-FIR database, it is possible for the offense's record to be hacked, and it is also possible for fake e-FIRs to be purposefully registered. Data transparency and integrity are therefore major issues with the e-FIR database. In this study, a consensus-based distributed blockchain approach is used to solve e-FIR data integrity and false registration added with police stations in a centralised database as a crucial component of a smart city environment.To study the possibilities of the Ethereum blockchain in ensuring integrity to e-FIR data housed in a police station's database, a smart contract-based intelligent framework has been used. Using the Web3 Remote Procedure Call (RPC) protocol, a local database is connected to the Ethereum blockchain. To assess how well the suggested framework performs, numerous simulations have been run. Our findings demonstrate a trade-off between the number of transactions contained in a single block on the blockchain ledger and the security level of various hashing algorithms for the offences data. [13]We can observe how technology has impacted many aspects of Indian society. Nearly every aspect of our existence uses technology, including commerce, banking, education, banking, communication, banking, socialising and preserving personal relationships. This technological incursion has aided the job in all of these parts, proven useful, and saved time and effort. The Indian Police Department is the only significant portion of our society that still lacks this luxury. Since then, the Indian Police Department has continued to perform the majority of its daily tasks manually. The conventional "pen and paper" method has been adopted by the officials as the fundamentally sound way to conduct the proceedings.When the population was much lower and crime rates were also much lower in the past, these customs were comfortable. However, managing the case and all of its connected documentation manually has become extremely difficult in modern India, where the pernicious parts of

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society are flourishing and there are so many cases being reported every day. The police agency urgently needs to digitise. There has to be an online alternative to the conventional approach of visiting a police station to file a police complaint and receive updates.As a result, an electronic police system is being created that will use a mobile application to collect complainant data before sending it to the police department via their web portal. In this way, the entire interaction will take place online with information being exchanged via both the application and the web portal. [14]India is experiencing a sharp rise in criminal activity. These activities are frequently not reported. Even though there is an internet platform for the police to store FIRs and NCRs, the majority of FIRs are still written by hand as is the custom. The complainant must typically be present at the police station to report a cognizable offence. In 2009, the Crime and Criminal Tracking Network and Systems (CCTNS) for the entire nation was launched as an efficient e-governance system. It is, however, a centralised system for a specific state. Therefore, a fully decentralised system is required to ensure that there is no single point of failure and that complaints are handled safely and securely to prevent unauthorised access.In order to manage complaints against both cognizable and non-cognizable offences, our goal is to develop a blockchain-based solution. The police's FIR will be hashed, encrypted, and stored in IPFS before being posted to the blockchain network. The complaint along with its timestamp was kept on the blockchain network, so if the police refuse to file the FIR as a result of pressure or claim they never received the complaint, the complainant will have good evidence against them. The possibility of the FIR/NCR being tampered with and going unreported would be eliminated if all the records were kept in an immutable database. [15]The most crucial component for the nation's (Indian) population is the police station. Every time a crime occurs in the city, a person must first call the police station. Due to the fact that the city's police stations still manually process paperwork like First Information Reports (FIRs), there is a potential that certain records will be missed. The proposed online system for police stations, Intellectual and Enhance Digital Solutions (IEDS), will assist users and police officers in digitising their job. The database records will be maintained by this system. IEDS integrate a number of the city's police stations. information on murders, missing persons, photo reports, etc.IEDS additionally has a user component for seeing the status report that may be accessed more securely with an OTP. By providing access to the papers that the police have uploaded, this system will also assist the attorney in coordinating with the victim and the police. The Apriori Algorithm will also be used in this system's analysis of criminal records. When a person calls the police station with questions about a missing person, a missing vehicle, the progress of their case, etc., the system will lighten the strain on the officers as well as local traffic. Additionally, it will lessen paperwork, which will help preserve forests.

## III. PROPOSED METHODOLOGY

Here is a proposed methodology for using blockchain to secure fir By using blockchain technology in this way, the FIR can be securely stored and easily verified. The public nature of the blockchain ensures transparency and makes it difficult for anyone to tamper with the FIR without being detected. This can help improve the overall transparency and accountability of the FIR process, and provide greater confidence in the criminal justice system.

- **Creation of FIR**: The first step is to create the FIR in a digital format, which includes all the necessary details like the date, time, location, nature of the crime, and details of the victim and accused. The FIR should be digitally signed by the police officer in charge.
- **Hashing of FIR**: The next step is to generate a cryptographic hash of the FIR. A hash is a unique digital fingerprint of the FIR that cannot be reversed engineered to retrieve the original FIR.
- **Storing of hash on blockchain**: The hash of the FIR is then stored on a public blockchain. The public nature of the blockchain makes it easy for anyone to verify the authenticity of the hash, and ensures that it cannot be tampered with.
- **Encryption of FIR**: The FIR data itself is then encrypted using advanced encryption algorithms and stored in a secure centralized database.
- **Provision of access to authorized parties**: Access to the FIR can be provided to authorized parties like the victim, lawyers, or courts using secure login credentials. Only authorized parties with the correct login credentials will be able to access the FIR.

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- **Updating of FIR**: If there are any updates to the FIR, such as new evidence or information, a new hash of the updated FIR is generated, and the hash is added to the blockchain. The old hash is kept intact, ensuring the integrity of the original FIR.
- **Verification of FIR**: Anyone can verify the authenticity of the FIR by comparing the hash stored on the blockchain with the hash of the FIR received from the centralized database. If the hashes match, it can be assumed that the FIR has not been tampered with.

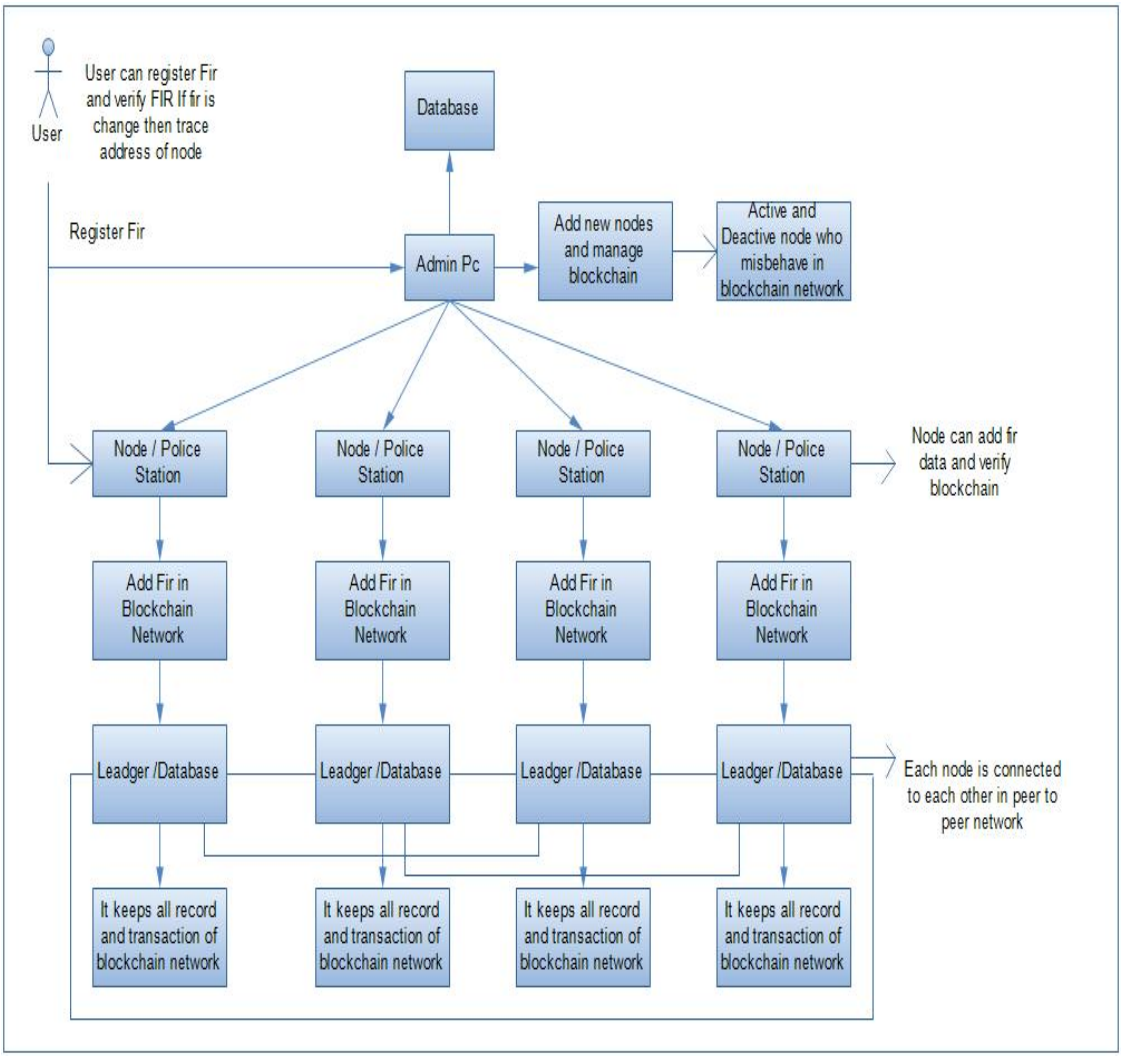


Figure 1. System Architecture

## IV. RESULT AND DISCUSSION

A secure FIR system using blockchain technology can provide several benefits to the traditional process of filing a First Information Report (FIR) in a police station. The use of blockchain technology ensures the immutability and transparency of the data, making it difficult to tamper with or alter the FIR once it has been filed. After filing the FIR using the blockchain-based web application, the complainant will have a digital record of the FIR, which they can access anytime and from anywhere. This record can be shared with relevant authorities, such as the police as and when required. Furthermore, the blockchain-based system can also ensure that the FIR is processed efficiently and quickly, reducing the chances of delay or manipulation. The use of the blockchain system can automate several aspects of the FIR process, such as verification, validation, and notification, making the entire process more secure and streamlined.

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The result of a secure FIR system using blockchain technology can be a more efficient, transparent, and secure process for filing and processing FIRs, which can provide a higher degree of trust and confidence to the complainant and relevant authorities.

## V. CONCLUSION

The utilizing blockchain technology to advance the under-resourced field of record management in police stations in order to stop data manipulation and false report submission. Based on the findings, a consensus-based method for using blockchain to ensure the privacy of crime data kept in police station databases has been put forth. Users can submit a FIR at any time and from any location, eliminating the need to visit a police station. The public can interact directly with the government and has access to all official information. The status report for each person's case is also available for review.As they would have immediate access to superiors, relations between the populace and the police will be improved, as will those between the government and its constituents. Hash chains, consensus mechanisms, and cryptographic algorithms are all combined in the blockchain technology to provide services like consensus. For online data, irreversibility traceability is necessary. In this project, we're attempting to safeguard police department data via a blockchain network, based on these programmers. We are trying to use the blockchain to secure data on a distributed network since criminal histories and records are delicate records and sharing them online poses a risk.

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