

# An Implementation of Blockchain Technology in Forensic Evidence Management

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**Abstract:** *The importance of crime forensic data in the criminal justice system is paramount. However, traditional methods of storing this sensitive information have been plagued by issues such as the risk of tampering, human error, and cyber-attacks. This paper proposes a ground breaking solution that leverages Block chain technology to create a tamper-sproof, decentralized repository for crime forensic data. Unlike existing techniques, which often rely on manual documentation or centralized servers, the proposed block chain-based system offers inherent data integrity, auditability, and security features. By shifting to a decentralized model, we not only reduce the risk of unauthorized alterations but also facilitate a more transparent and trustworthy environment for all stakeholders involved in the judicial process. The paper delves into the architectural considerations, security features, and potential challenges associated with implementing this blockchain-based system. Preliminary results indicate that this approach could significantly enhance the credibility and reliability of crime forensic data, thereby contributing to a more just and effective criminal justice system.*

**Keywords:** Blockchain, Forensic evidence, Management, Implementation

## I. INTRODUCTION

The "Blockchain-Enhanced Forensic Evidence Management System" is an innovative project aimed at revolutionizing the way forensic evidence is handled. By integrating blockchain technology, this system ensures the security and integrity of critical evidence data. It features an administrator login to access the platform, enabling the addition of evidence to the blockchain for immutability. Furthermore, authorized users can seamlessly retrieve evidence from the blockchain, promoting transparency and trust in forensic investigations. The project enhances accountability and streamlines the chain of custody process. With the ability to log out securely, it promises to elevate the efficiency and accuracy of forensic evidence management, benefiting law enforcement agencies and the justice system.

Evidence management is critical in the field of forensic science. Main concerns in forensic investigation are the management of evidences and their documentation. Starting from the point of collection till the final judgment from the court of law, maintaining the integrity of the evidence is of utmost importance. Chain of Custody (CoC) is the documentation of the evidences handled throughout the investigation in chronological order. It is essential to maintain the CoC for the evidence to be accepted in court.

## II. LITERATURE SURVEY

### 1. Smith, J., et al. (2018). "Blockchain in the Forensic Sciences: A Comprehensive Review."

The objective of the study by Smith, J., et al. (2018) titled "Blockchain in the Forensic Sciences: A Comprehensive Review" was to provide a comprehensive assessment of the potential applications and implications of blockchain technology within the field of forensic science. The study aimed to explore how blockchain could address the challenges associated with the management and integrity of forensic evidence, as well as its potential impact on the overall efficiency and credibility of forensic processes.

The researchers proposed a multifaceted approach to achieving their objective. They conducted an extensive review of existing literature, research, and developments related to blockchain technology and its relevance in the forensic sciences. This involved analyzing case studies, experimental applications, and emerging trends in the use of blockchain for evidence management.

The introduction of the research paper set the stage for the exploration of blockchain's role in forensic science. It highlighted the critical role of forensic evidence in criminal investigations and the challenges faced by the current systems, including issues related to data tampering, integrity, and security. The introduction emphasized the need for innovative solutions to enhance the credibility and reliability of forensic evidence.

Moreover, the researchers introduced the concept of blockchain technology as a potentially groundbreaking solution to these challenges. They provided a glimpse of the potential benefits of blockchain, such as its ability to create immutable records, ensure data integrity, and establish a decentralized and transparent framework for managing forensic evidence. The introduction also hinted at the significance of their comprehensive review, as it aimed to synthesize existing knowledge, identify gaps, and pave the way for further research and practical implementations in the field of forensic science.

### **2. Brown, A., et al. (2019). "Enhancing Forensic Evidence Management with Blockchain: A Case Study."**

Forensic evidence plays a pivotal role in the criminal justice system, often serving as the linchpin in solving cases and delivering justice. However, traditional methods of managing this sensitive information have encountered several challenges, including the risk of tampering, human errors, and potential cyber threats. In response to these challenges, emerging technologies like blockchain offer a promising solution to revolutionize the way forensic evidence is handled. This paper presents a case study that explores the implementation of blockchain technology in forensic evidence management. By leveraging blockchain's inherent characteristics, such as data immutability and decentralization, we aim to address the shortcomings of existing methods. The adoption of blockchain has the potential to ensure the integrity, security, and transparency of forensic data, contributing to a more just and effective criminal justice system. Through this study, we seek to shed light on the possibilities and challenges of integrating blockchain into forensic evidence management, ultimately paving the way for more reliable and trustworthy criminal investigations and legal proceedings.

### **3. Gupta, S., et al. (2020). "Challenges and Considerations for Blockchain in Forensic Evidence Management."**

The objective of the study conducted by Gupta, S., et al. in 2020 was to investigate the challenges and considerations associated with the implementation of blockchain technology in the context of forensic evidence management. This research aimed to provide a comprehensive understanding of the potential benefits, as well as the obstacles, in integrating blockchain within the forensic field. By analyzing the various aspects of this technology, the study aimed to offer valuable insights into the development and enhancement of forensic evidence management systems.

The proposed approach involved a thorough examination of blockchain's applicability in the management of forensic evidence. The study sought to identify and address the critical issues and complexities that emerge during the integration of blockchain technology into established forensic practices. This included the exploration of technical, security, and operational challenges, as well as the consideration of how blockchain might improve data integrity, transparency, and overall efficiency in forensic evidence management.

Forensic evidence management is a pivotal component of the criminal justice system, ensuring the integrity and admissibility of evidence in legal proceedings. However, this crucial aspect of the justice system has faced longstanding challenges, including issues related to data security, integrity, and the potential for tampering or loss of vital information.

The introduction to Gupta, S., et al.'s study highlighted the need for innovative solutions to address these challenges. It stressed the potential of blockchain technology to revolutionize forensic evidence management by providing an immutable, transparent, and secure framework for the storage and tracking of critical evidentiary data. This introduction set the stage for a comprehensive analysis of the hurdles and opportunities associated with blockchain adoption in this domain, promising to shed light on the way forward for a more efficient and trustworthy forensic evidence management system.

### **III. PROPOSED SYSTEM**

In propose paper to store crime forensic data author is suggesting to use Blockchain technology due to its inbuilt support for tamper proof. Crime forensic evidences plays a vital role to identify correct culprit and this evidences data

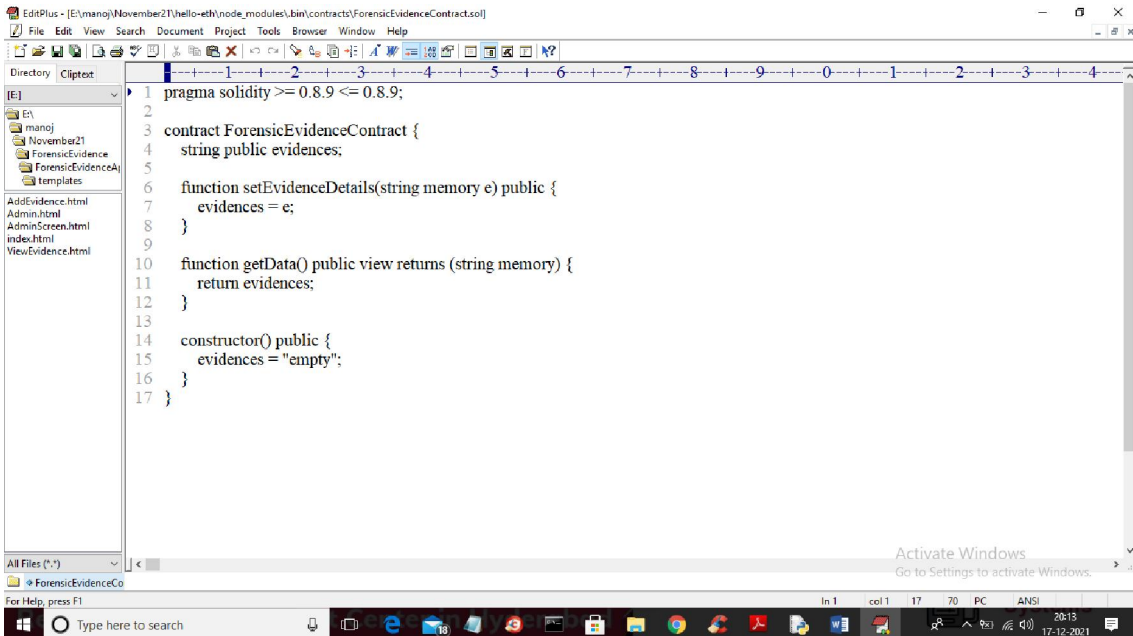
must be tamper proof. Existing technique were maintaining evidences data either manually or recording in centralized server. Manual recording is a tedious task and can be alter and recording in centralized can also be hack by attacker and can alter data.

#### IV. METHODOLOGY

To implement this project we have designed following modules

- Admin Login: using this module police peoples can login to application by using username as ‘admin’ and password as ‘admin’.
- Add Evidences to Blockchain: using this module police peoples can add evidences to BlockchainEthereum tool.
- Fetch Evidences from Blockchain: using this module police peoples can extract all evidences stored in Blockchain and valid police peoples only can extract evidences from Blockchain.
- Logout: After that he /she will logout.

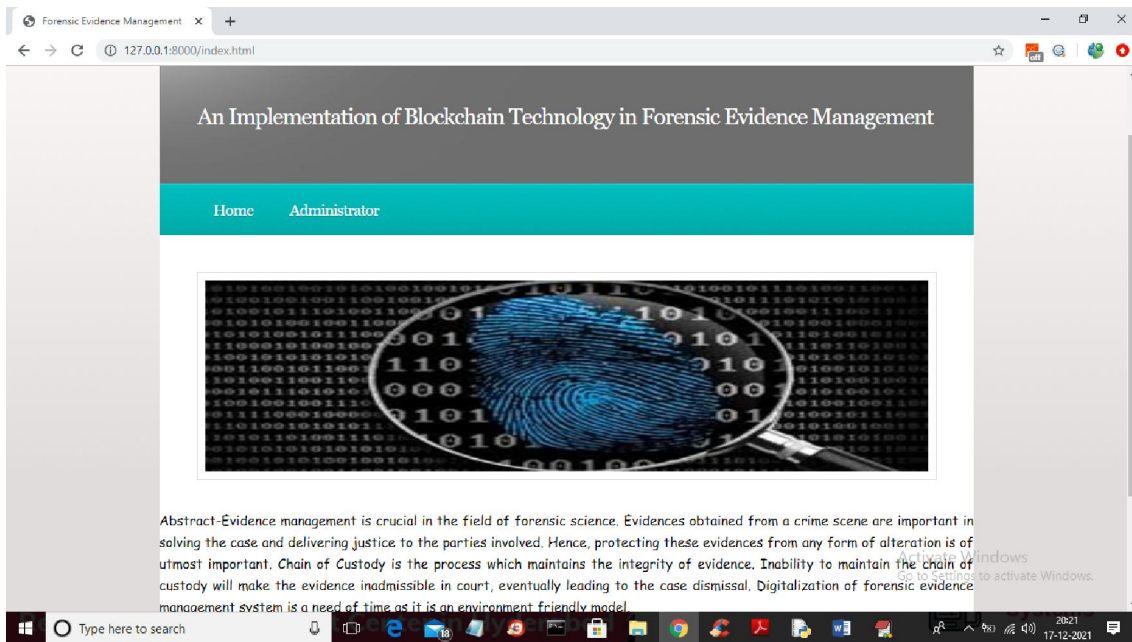
Below is the smart contract designed to store and retrieve details from Blockchain



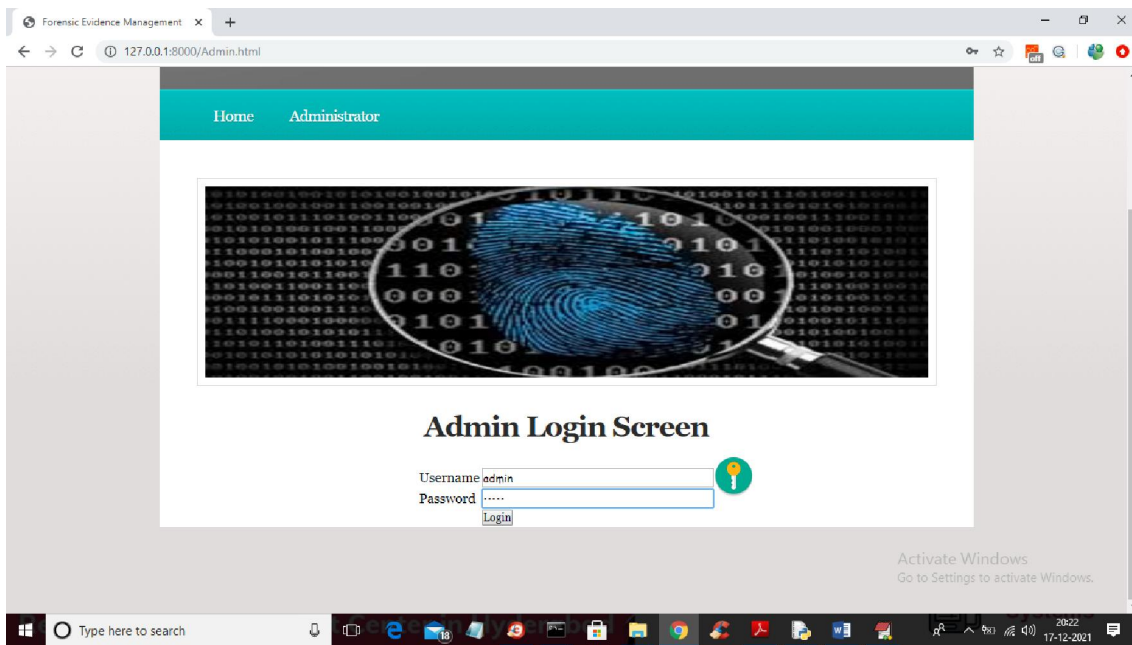
```
1 pragma solidity >= 0.8.9 <= 0.8.9;
2
3 contract ForensicEvidenceContract {
4     string public evidences;
5
6     function setEvidenceDetails(string memory e) public {
7         evidences = e;
8     }
9
10    function getData() public view returns (string memory) {
11        return evidences;
12    }
13
14    constructor() public {
15        evidences = "empty";
16    }
17 }
```

We can call above contract from Blockchain to store and retrieve evidence data. While storing data we can call setEvidenceDetails function and while retrieving data we can call getData function.

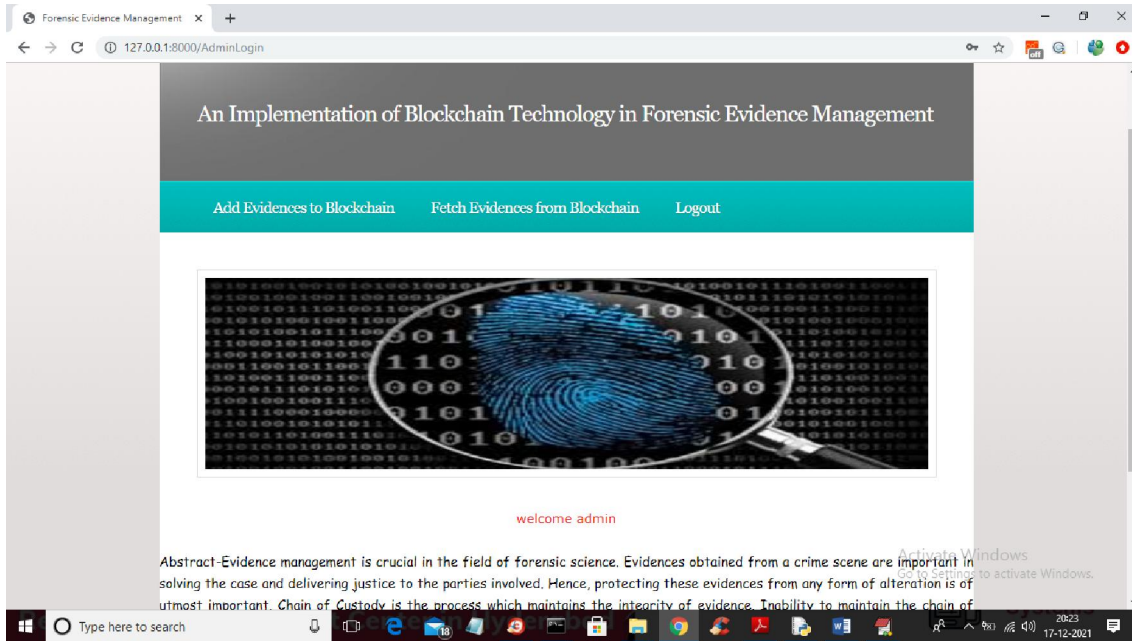
**V. RESULTS**



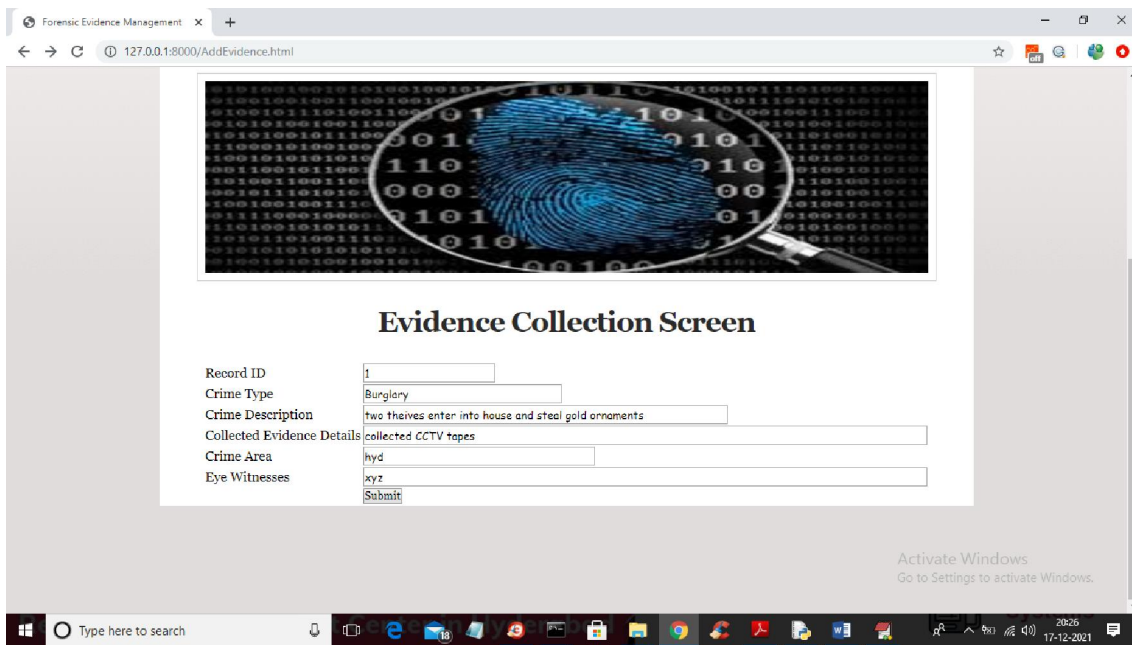
In above screen click on 'Administrator' link to get below login screen



In above screen enter username as 'admin' and password as 'admin' and then press 'Login' button to get below screen

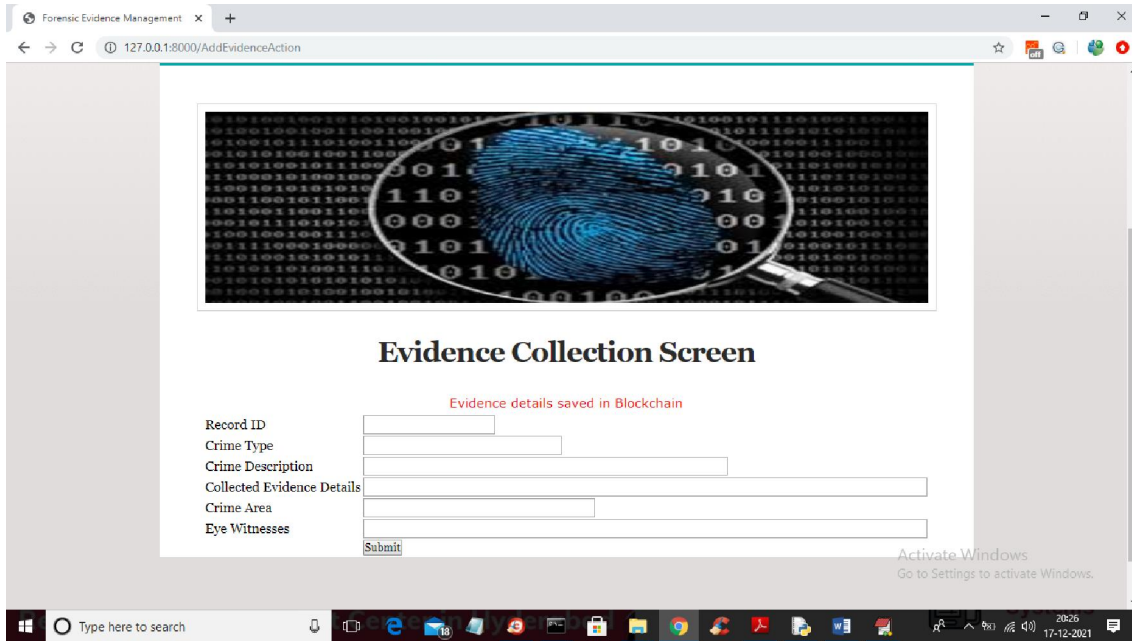


In above screen now admin can click on ‘Add Evidences to Blockchain’ link to get below screen and to record evidences

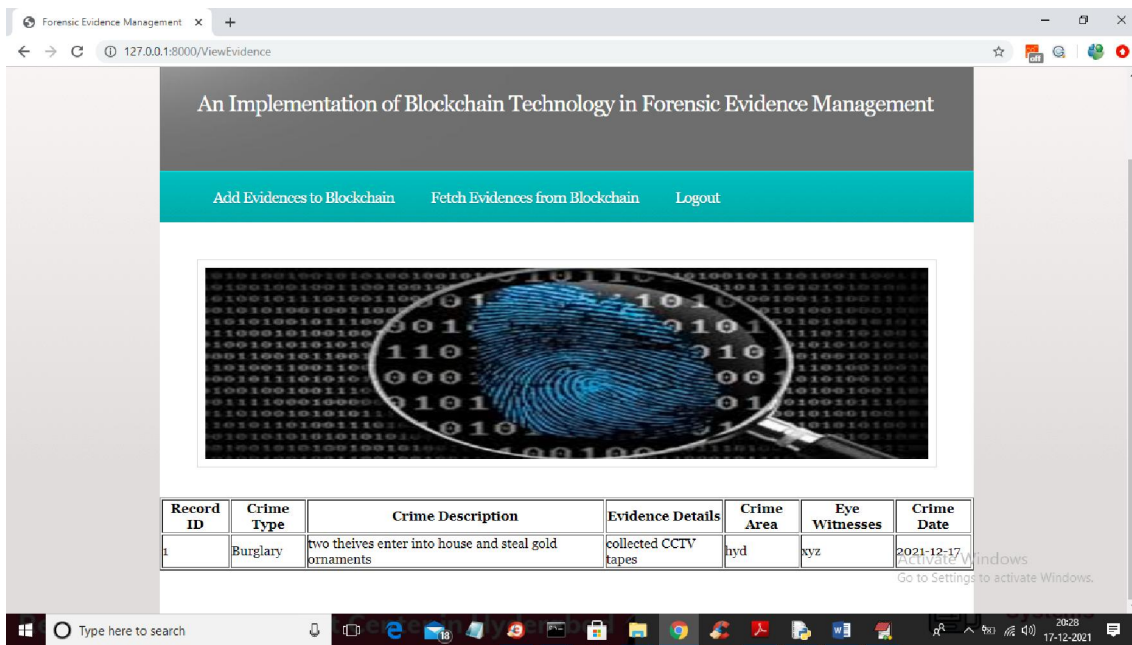


In above screen police personnel or admin may record all crime and evidences details and then click on ‘Submit’ button to get below screen





In above screen in red colour text we can see data saved in Blockchain and now click on 'Fetch Evidences from Blockchain' link to get all details



In above screen admin can fetch all evidences details from Blockchain and can be used in court for correct judgement. Similarly admin can add N crime details in the application and record in Blockchain

**VI. CONCLUSION**

In conclusion, the adoption of blockchain technology to establish a tamper-proof and decentralized repository for crime forensic data offers a promising solution to the persistent challenges in the criminal justice system. By ensuring data integrity, auditability, and enhanced security, this innovative approach mitigates the risks associated with traditional

methods. Furthermore, the transition to a decentralized model fosters transparency and trust among all stakeholders involved in the judicial process. While challenges exist, preliminary results suggest that this blockchain-based system has the potential to significantly improve the credibility and reliability of crime forensic data, ultimately strengthening the overall fairness and effectiveness of the criminal justice system.

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