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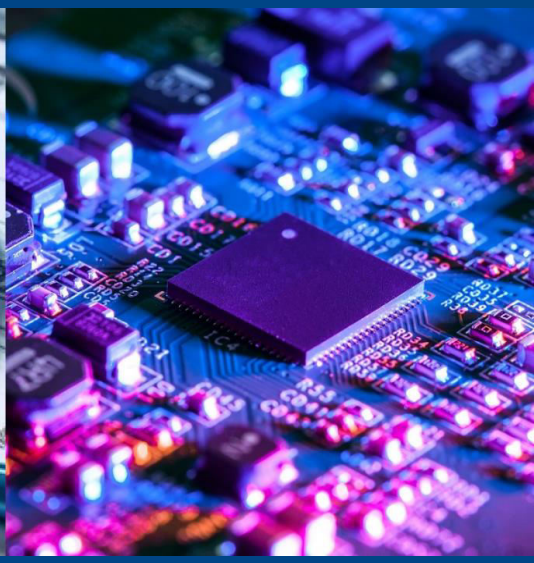

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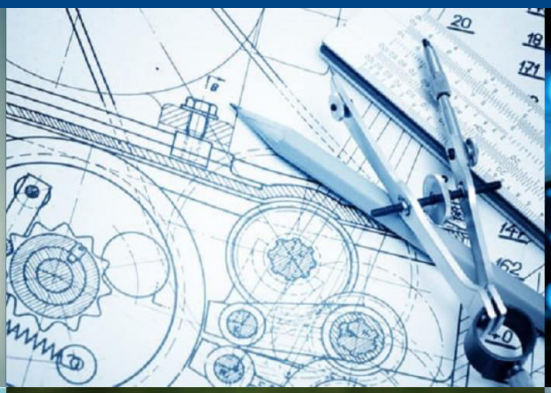

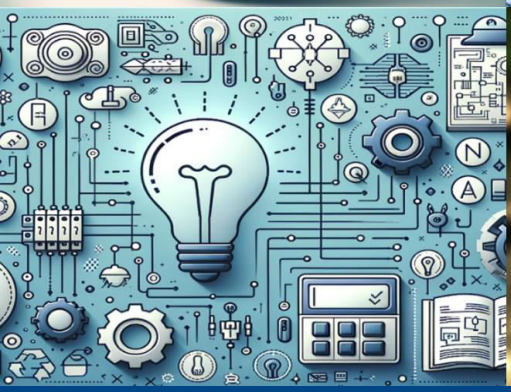

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Mobile Apps for Citizens and Police for Management of Crime Records

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ABSTRACT: Efficient crime reporting and management are essential for maintaining public safety and improving the effective- ness of law enforcement agencies. In many regions, traditional crime reporting systems still rely on manual procedures where citizens must physically visit police stations to file complaints or First Information Reports (FIR). This process often leads to delays in complaint registration, lack of transparency, and inefficient record management. To address these challenges, this paper proposes a mobile application–based crime reporting and management system that connects citizens and police authorities through a digital platform.

The proposed system consists of two mobile applications: a cit- izen application and a police application. The citizen application allows users to report crimes, upload supporting evidence such as images or documents, and track the status of their complaints in real time. The police application enables officers to review submitted complaints, assign investigation officers, update case progress, and maintain centralized crime records.

The system integrates secure authentication, centralized databases, and real-time notification services to ensure efficient and transparent crime management. The proposed solution improves accessibility, reduces paperwork, and enhances com- munication between citizens and law enforcement agencies.

KEYWORDS: Crime Reporting, Mobile Application, Smart Policing, Digital FIR, Crime Data Management

I. INTRODUCTION

Efficient crime reporting and record management are essential for maintaining public safety and improving the operational efficiency of law enforcement agencies. In many countries, traditional crime reporting systems require citizens to physically visit police stations to file complaints or First Information Reports (FIR). This manual approach often results in delays in complaint registration, inefficient record management, and limited transparency in the investigation process. Citizens may also face difficulties in tracking the status of their complaints or communicating with police authorities after filing a report.

Traditional paper-based crime management systems also create challenges for law enforcement agencies. Managing large volumes of crime records in physical files makes it difficult to search previous cases, analyze crime patterns, and maintain accurate records. In addition, manual documentation processes increase the risk of data loss, misplacement of records, and human errors. Recent advancements in mobile technologies and digital governance platforms provide new opportunities to modernize crime reporting systems. Mobile applications enable citizens to report incidents directly through smartphones without visiting police stations. These platforms allow users to submit crime reports, upload supporting evidence such as images or videos, and receive real-time updates about the progress of their complaints.

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This paper proposes a mobile application-based system designed to support both citizens and police authorities in managing crime records efficiently. The proposed system consists of two interconnected mobile applications: a citizen application and a police management application. The citizen application enables users to report crimes, provide detailed descriptions of incidents, upload digital evidence, and track complaint status in real time. The police application provides a secure interface for law enforcement officers to review submitted complaints, assign investigation officers, update case status, and maintain centralized crime records.

The proposed system integrates mobile technologies, centralized databases, and secure authentication mechanisms to create a transparent and efficient crime management platform. By digitizing the crime reporting process, the system reduces paperwork, improves accessibility of reporting services, and enhances communication between citizens and police authorities.

The main contributions of this paper include:

- Development of a mobile application platform for digital crime reporting
- Integration of citizen and police mobile applications for

crime management

- Secure storage and management of crime records in a centralized database
- Real-time complaint tracking and case status updates
- Improved communication between citizens and law enforcement agencies

The remainder of this paper is organized as follows. Section II discusses related work in digital crime reporting systems. Section III describes the proposed system architecture. Section IV presents the implementation details. Section V discusses the experimental setup and evaluation results. Section VI highlights limitations and future research directions. Finally, Section VII concludes the paper.

II. RELATED WORK

Traditional crime reporting systems rely heavily on manual processes where citizens must visit police stations to register complaints or file First Information Reports (FIR). These paper-based systems require significant administrative effort and often lead to delays in complaint registration and investigation processes. Managing large volumes of physical crime records also makes it difficult for law enforcement agencies to efficiently track cases, analyse crime trends, and maintain accurate records. Several studies have highlighted that manual reporting systems reduce transparency and limit effective communication between citizens and police authorities.

To address these challenges, governments and law enforcement agencies have introduced digital crime reporting platforms as part of e-governance initiatives. Online FIR registration systems allow citizens to submit complaints through web portals without visiting police stations. These systems improve accessibility and reduce paperwork. However, many existing online platforms provide only basic reporting features and lack advanced functionalities such as real-time complaint tracking and integrated communication between citizens and police officers.

Recent research has explored the use of mobile technologies to enhance public safety and smart policing systems. Mobile applications allow citizens to report incidents instantly using smartphones and provide additional features such as location tracking, evidence upload, and emergency alerts. Several smart city projects have implemented mobile-based crime reporting systems to improve the responsiveness of law enforcement agencies.

Cloud-based databases and digital record management systems have also been introduced to improve crime data storage and accessibility. These technologies enable centralized storage of crime records, allowing police authorities to manage case information more efficiently. However, many existing systems still lack effective mechanisms for real-time case tracking, digital evidence management, and seamless integration between citizen reporting platforms and police investigation systems.

Despite these developments, current crime reporting platforms often focus only on digital complaint submission and do not fully support end-to-end crime record management. The integration of mobile applications for both citizens and police officers remains limited in many systems. This paper addresses these limitations by proposing a mobile application platform that connects citizens and police authorities through a unified crime management system. The proposed approach enables citizens to report crimes, upload evidence, and track case progress while allowing police officers to manage investigations and maintain centralized digital crime records.

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III. PROPOSED SYSTEM

This paper proposes a mobile application-based platform for managing crime records and improving communication between citizens and law enforcement agencies. The proposed system enables citizens to report crimes digitally while allowing police authorities to manage complaints and investigations through a centralized platform. The system aims to improve transparency, reduce manual paperwork, and enhance the efficiency of crime record management.

The overall architecture consists of five major components: Citizen Reporting Module, Police Management Module, Crime Record Database, Complaint Tracking System, and Notification and Communication Module.

Citizen Reporting Module

The Citizen Reporting Module allows users to report crimes through a mobile application. Citizens can register and log into the system using secure authentication mechanisms. After logging in, users can submit complaints by providing incident details such as location, date, description of the crime, and type of incident. The application also allows users to upload supporting evidence such as images or documents related to the incident. Each submitted complaint is stored in the centralized database with a unique complaint identification number. Each complaint record includes attributes such as Complaint ID, Timestamp, Citizen ID, Incident Location, Crime Description, and Uploaded Evidence. This module simplifies the crime reporting process and allows citizens to submit complaints without visiting police stations.

Police Management Module

The Police Management Module provides a secure dashboard for police officers to manage crime reports and investigation activities. Police officers can access submitted complaints, review incident details, and assign investigation officers to specific cases. The module allows officers to update the status of each case, such as "Under Investigation," "Resolved," or "Closed." Officers can also add investigation notes and attach additional evidence collected during the investigation process. This module improves efficiency in crime record management and enables law enforcement agencies to track case progress effectively.

Crime Record Database

The Crime Record Database acts as a centralized repository for storing all complaint information and investigation records. The database maintains structured records of reported incidents, uploaded evidence, and case updates. A centralized database enables efficient storage, retrieval, and management of crime records. Police authorities can also analyse stored data to identify crime patterns and generate crime statistics.

Complaint Tracking System

The Complaint Tracking System allows citizens to monitor the status of their submitted complaints through the mobile application. Each complaint is assigned a unique tracking number that can be used to check the progress of the investigation. Police officers update the case status in the system, and the updated information is reflected in the citizen application. This feature improves transparency and helps build trust between citizens and law enforcement agencies.

Notification and Communication Module

The Notification and Communication Module provides real-time updates to both citizens and police officers. Citizens receive notifications when their complaints are registered, when investigation officers are assigned, and when the case status changes. Police officers also receive alerts when new complaints are submitted. This module ensures effective communication and enables faster response to reported incidents.

IV. MATHEMATICAL MODEL

The proposed mobile application system for crime record management incorporates mathematical models to prioritize reported incidents and evaluate system efficiency. These models assist law enforcement authorities in identifying urgent cases and improving investigation management. The mathematical framework focuses on crime priority evaluation, response time efficiency, and case resolution rate.

Crime Priority Model

To ensure that critical cases receive immediate attention, the system calculates a priority score based on the severity of the crime and the risk level of the reported location. The priority score is calculated as:

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$$\text{Priority} = \text{CrimeSeverity} + \text{LocationRisk}$$

where CrimeSeverity represents the seriousness of the reported crime, and LocationRisk represents the risk level of the location where the incident occurred. For example, if the severity of a crime is rated as 7 and the location risk level is 3, the calculated priority becomes:

$$\text{Priority} = 7 + 3 = 10$$

Higher priority values indicate incidents that require immediate attention.

Response Time Model

The response time model measures the efficiency of police response after a crime is reported through the mobile application. The response time is defined as the difference between the time when the complaint is submitted and the time when police officers begin the investigation. It is calculated as:

$$\text{ResponseTime} = \text{InvestigationStartTime} - \text{ComplaintSubmissionTime}$$

Lower response time values indicate faster action by law enforcement authorities.

Case Resolution Rate Model

The effectiveness of the crime management system can be evaluated using the case resolution rate. This metric measures the percentage of reported cases that have been successfully resolved. The resolution rate is calculated as:

$$\text{ResolutionRate} = (\text{ResolvedCases} / \text{TotalReportedCases}) \times 100$$

where ResolvedCases represents the number of cases successfully completed, and TotalReportedCases represents the total number of submitted complaints. For example, if 80 cases are resolved out of 100 reported incidents, the resolution rate becomes:

$$\text{ResolutionRate} = (80 / 100) \times 100 = 80\%$$

The proposed mobile application platform integrates citizen reporting, police investigation management, and centralized crime record storage into a unified system. The system improves accessibility, enhances transparency, and provides an efficient digital solution for modern crime management.

V. CRIME REPORTING AND EVIDENCE MANAGEMENT ALGORITHM

The proposed system uses an automated Crime Reporting and Evidence Management Algorithm to handle the submission, storage, and processing of crime reports submitted by citizens through the mobile application. The algorithm ensures that reported complaints are securely stored in the centralized database and made available to police authorities for further investigation. It manages the complete workflow of the system, including complaint submission, evidence upload, complaint registration, case assignment, and complaint tracking. By automating these processes, the system improves the efficiency of crime reporting and ensures reliable management of crime records.

The steps of the Crime Reporting and Evidence Management Algorithm are described below:

Crime reporting and evidence management algorithm

1. Initialize the mobile crime reporting system and establish a secure connection with the backend server.
2. The citizen registers or logs into the mobile application using secure authentication credentials.
3. The citizen selects the *Report Crime* option from the application dashboard.
4. The system displays a digital complaint form where the user enters incident details such as crime type, incident location, date and time of occurrence, and description of the incident.
5. The citizen uploads supporting evidence such as photographs, videos, or documents related to the reported incident.
6. The mobile application validates the submitted data to ensure that all required fields are completed.
7. The system generates a unique Complaint ID for the reported case.

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8. The complaint details and uploaded evidence are securely transmitted to the backend server.
9. The backend server stores the complaint data and evidence files in the centralized crime record database.
10. The system sends a notification to the police management dashboard indicating that a new complaint has been registered.
11. Police officers access the complaint details through the police application or dashboard interface.
12. The supervising officer reviews the submitted information and assigns an investigation officer to the case.
13. The assigned officer begins the investigation and updates the case status in the system.
14. Possible case status updates include: Complaint Registered, Under Investigation, Evidence Verification, Case Resolved, and Case Closed.
15. Citizens can log into the mobile application to track the progress of their complaint using the generated Complaint ID.
16. The system continuously updates the complaint status and sends notifications to citizens regarding investigation progress.
17. All complaint records, investigation updates, and evidence files are maintained in the centralized database for future reference and analysis.

The proposed algorithm ensures efficient processing of crime reports and secure management of digital evidence. By automating complaint registration and investigation workflows, the system reduces manual paperwork and improves coordination between citizens and law enforcement authorities. In addition, the centralized database enables authorities to maintain accurate crime records and analyze crime patterns for better decision-making.

VI. THREAT MODEL AND SECURITY ANALYSIS

The proposed mobile crime reporting system operates in an environment where both internal and external attackers may attempt to access, manipulate, or delete sensitive crime records. This section defines the potential threats faced by the system and analyzes the security mechanisms implemented to mitigate these risks.

Threat Model

We consider the following adversarial capabilities:

- Unauthorized Access: Attackers may attempt to gain access to crime records without proper authentication.
- Fake Complaint Submission: Malicious users may attempt to submit false complaints in order to misuse the system.
- Evidence Tampering: Attackers may attempt to modify or replace uploaded evidence files such as images or documents.
- Data Deletion Attack: An attacker may attempt to delete complaint records from the centralized database.
- Insider Misuse: Internal users such as administrators may misuse their privileges to access sensitive information.
- Network Attacks: Attackers may attempt to intercept data transmitted between the mobile application and the backend server.

Security Analysis

The proposed system implements several security mechanisms to mitigate the identified threats.

- Secure Authentication: Users must log into the system using verified credentials.
- Role-Based Access Control: Different access permissions are assigned to citizens and police officers.
- Encrypted Communication: Data transmission between the mobile application and server is protected using secure communication protocols.
- Secure Data Storage: Crime records and evidence files are stored in a centralized database with controlled access.
- Timestamp Verification: Each complaint is recorded with timestamps to ensure traceability.
- Activity Logging: System activities are monitored and logged to detect suspicious behavior.

These mechanisms ensure the confidentiality, integrity, and availability of crime data in the proposed system.

VII. IMPLEMENTATION

The proposed system is implemented as a prototype mobile application platform designed to support digital crime reporting and efficient management of crime records by law enforcement agencies. The system integrates a citizen-facing mobile application with a police management interface connected through a backend server and centralized

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database. The implementation focuses on providing a practical and scalable solution that enables citizens to report crimes digitally while allowing police officers to review complaints, manage investigations, and maintain accurate crime records.

IMPLEMENTATION

The system architecture is designed to be lightweight and deployable using commonly available development tools and mobile technologies.

System Environment

The proposed system is implemented using modern mobile and web development technologies. The system consists of a mobile application for citizens, a management interface for police officers, and a backend server responsible for processing requests and storing data in a centralized database.

The system environment includes the following technologies:

- Mobile Application: Android / Flutter
- Programming Language: Java / Dart
- Backend Framework: Node.js with Express.js
- Database: MongoDB
- API Communication: REST API
- Authentication: JSON Web Token (JWT)
- Development Tools: Android Studio and Visual Studio Code

The application is designed to operate on standard smartphones and can also be accessed through web browsers for administrative and police management interfaces.

Crime Reporting Implementation

The citizen mobile application provides an intuitive interface that allows users to submit crime reports directly from their smartphones. Users can enter essential information about the incident, including crime type, incident location, date and time of occurrence, and a detailed description of the event. The application also allows users to upload supporting evidence such as photographs, videos, or documents related to the reported incident.

Each submitted report is assigned a unique Complaint ID that enables both citizens and police officers to track the progress of the case. An example complaint record format is shown below:

ComplaintID: CR1023
Timestamp: 2026-03-10
CitizenID: C204
Location: Chennai
CrimeType: Theft
Description: Mobilephonestolenatbusstop
Evidence: image1.jpg

Police Management Implementation

Police officers access reported complaints through a secure management dashboard. The dashboard allows officers to review submitted complaints, verify incident details, and assign investigation officers to specific cases. Officers can update case status such as *Registered*, *Under Investigation*, or *Resolved*. The system also enables officers to add investigation notes and attach additional evidence collected during the investigation process.

Crime Record Database Implementation

The system uses a centralized MongoDB database to store crime records, complaint details, uploaded evidence, and investigation updates. Each complaint record is stored as a structured document containing relevant attributes such as complaint ID, timestamps, citizen details, incident description, and case status. The centralized database enables efficient storage, retrieval, and analysis of crime data, allowing law enforcement agencies to monitor crime patterns and maintain organized digital records.

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Notification and Tracking Implementation

The system includes a notification mechanism that informs citizens whenever the status of their complaint changes. When police officers update the case status, the system automatically sends notifications to the citizen through the mobile application. Citizens can also track their complaint progress by entering their Complaint ID in the application.

Dashboard Implementation

A management dashboard is provided for police authorities to monitor overall system activity. The dashboard displays information such as registered complaints, case status distribution, and basic crime statistics. Police administrators can use the dashboard to track investigation progress and manage crime records efficiently.

The implementation demonstrates the feasibility of the proposed mobile crime management system and highlights its potential to improve digital crime reporting, enhance transparency, and support efficient investigation management.

VIII. EXPERIMENTAL SETUP

A small-scale experimental evaluation was conducted to assess the feasibility and functionality of the proposed mobile crime reporting and management system. The experiment aimed to test the system's ability to process crime reports submitted by citizens, store complaint data in the centralized database, and allow police officers to manage investigation records efficiently.

Test Environment

The experimental setup was conducted using multiple devices within a controlled development environment. The system consisted of a citizen mobile application, a backend server, and a police management interface connected to a centralized database.

The testing environment included the following components:

- Mobile Device 1: Android Smartphone (Citizen Application)
- Mobile Device 2: Android Smartphone (Citizen Application)
- Server System: Windows 11 with Node.js Backend Server
- Database Server: MongoDB Database
- Police Interface: Web Dashboard accessed through a desktop browser

IX. EXPERIMENTAL SETUP (CONTINUED)

All devices were connected through a local network to simulate real-time communication between the mobile applications and the backend server.

Test Procedure

The experiment was conducted using multiple simulated users representing citizens and police officers. Several test cases were performed to evaluate the functionality of the proposed system.

The test procedure involved the following steps:

1. Citizens registered and logged into the mobile application.
2. Users submitted crime reports including incident details such as location, date, and description.
3. Supporting evidence such as images was uploaded through the mobile application.
4. The backend server stored the complaint information in the centralized MongoDB database.
5. Police officers accessed the submitted complaints through the management dashboard.
6. Investigation officers were assigned to the reported cases.
7. Police officers updated the complaint status during the investigation process.
8. Citizens tracked the status of their complaints using the assigned Complaint ID.

During the experiment, a total of 30 simulated crime reports were submitted through the mobile application to test the system's data handling and case management capabilities.

Experimental Observations

The experimental evaluation demonstrated that the proposed system successfully handled all test scenarios. The system was able to:

- Register and store citizen crime reports in the centralized database

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- Upload and manage digital evidence associated with complaints
- Allow police officers to review and manage reported incidents
- Update complaint status in real time
- Enable citizens to track complaint progress using the Complaint ID

The results indicate that the proposed mobile-based crime reporting system improves accessibility and efficiency in crime record management. The experimental evaluation validates the practical feasibility of the system for digital crime reporting and police investigation support.

X. RESULTS AND DISCUSSION

The proposed mobile application system for crime reporting and management was evaluated to analyze its effectiveness in improving communication between citizens and law enforcement agencies. The evaluation focused on system usability, complaint processing efficiency, and the ability of the system to maintain organized digital crime records.
During the experimental testing phase, multiple simulated users submitted crime reports using the citizen mobile application. The system successfully processed all submitted complaints and stored the data in the centralized MongoDB database. Each complaint was assigned a unique Complaint ID, enabling both citizens and police officers to track investigation progress.

Police officers accessed submitted complaints through the management dashboard and reviewed incident details such as crime type, location, description, and uploaded evidence. The dashboard allowed officers to assign investigation officers and update the status of each case. The updated case information was immediately reflected in the citizen application, enabling real-time tracking of complaint progress.

The results demonstrate that the proposed system significantly reduces the time required for crime reporting compared to traditional methods where citizens must visit police stations physically. In addition, the centralized database improves organization and retrieval of crime records, making it easier for law enforcement agencies to analyze data and manage investigations efficiently.

The experimental results indicate that the proposed mobile crime management platform improves transparency, accessibility, and operational efficiency. By integrating citizen reporting and police investigation management into a single digital platform, the system provides a practical solution for modern digital policing and smart governance initiatives.

XI. LIMITATIONS AND FUTURE WORK

Although the proposed mobile application system for managing crime records provides an effective digital platform for communication between citizens and police authorities, several limitations and open challenges remain. Addressing these limitations will improve scalability, reliability, and effectiveness in real-world deployments.

Implementation and Scalability Constraints

One of the primary challenges is ensuring system scalability when the number of users increases significantly. The current prototype has been designed and tested using a limited number of users within a controlled environment. In real-world scenarios, the system may need to handle thousands of citizens submitting complaints simultaneously while multiple police departments access crime records.

In addition, the system relies on a centralized database for storing crime reports and evidence files. As the number of stored records grows over time, efficient data storage, indexing, and retrieval mechanisms will be required to maintain performance. Future deployments may require cloud-based infrastructure and distributed database systems to ensure scalability and high availability.

Experimental and Dataset Limitations

The experimental evaluation of the proposed system was conducted in a controlled laboratory environment using simulated crime reports and test users. Although the results demonstrate system functionality, they may not fully reflect real-world conditions where network delays, high traffic loads, and unpredictable user behavior can occur.

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LIMITATIONS AND FUTURE WORK

Experimental and Dataset Limitations

The experimental evaluation of the proposed system was conducted in a controlled laboratory environment using simulated crime reports and test users. Although the results demonstrate the feasibility and functionality of the system, larger-scale experiments involving real-world users and law enforcement agencies are necessary to evaluate the robustness and reliability of the platform.

Future evaluations should involve multiple police stations, larger datasets of crime reports, and long-term monitoring of system performance to assess its effectiveness in practical deployments.

System and Verification Limitations

The current implementation relies on manual verification of complaints by police officers. While this approach helps prevent misuse of the system, it may increase the workload of law enforcement agencies when the number of submitted complaints becomes large. Additionally, the system currently supports basic evidence types such as images and documents. Advanced evidence formats such as real-time video streams, GPS tracking, or automated verification mechanisms are not yet fully integrated.

Furthermore, there is a possibility of false or misleading reports being submitted by malicious users. Additional mechanisms for validating and filtering suspicious complaints may be required in future versions of the system.

Future Research Directions

Future work will focus on several enhancements to improve the functionality and intelligence of the proposed crime management platform. Potential improvements include:

- Integration of Geographic Information Systems (GIS) for visualizing crime locations and identifying crime hotspots.
- Incorporation of machine learning techniques to analyze crime patterns and support predictive crime analysis.
- Development of advanced evidence management features such as video evidence and geolocation tracking.
- Implementation of automated complaint verification mechanisms to detect false or duplicate reports.
- Integration with national crime databases and law enforcement information systems.
- Development of more advanced dashboards for real-time crime statistics and investigation monitoring.

Addressing these limitations will enhance the scalability, intelligence, and real-world applicability of the proposed mobile crime reporting and management system.

XII. ADVANTAGES OF PROPOSED SYSTEM

- Faster crime reporting
- Reduced paperwork
- Centralized database
- Real-time tracking
- Secure evidence storage

XIII. CONCLUSION

This paper presented a mobile application–based crime reporting and management system designed to improve communication between citizens and law enforcement agencies. Traditional crime reporting systems often rely on manual procedures where citizens must visit police stations to submit complaints, which can lead to delays, lack of transparency, and inefficient record management. The proposed system addresses these challenges by providing a digital platform that allows citizens to report crimes using mobile applications while enabling police authorities to manage complaints through a centralized system.

The proposed platform integrates a citizen mobile application, a police management interface, and a backend server connected to a centralized database. Citizens can submit crime reports, upload supporting evidence, and track the status of their complaints in real time. Police officers can review complaints, assign investigation officers, update case progress, and maintain organized digital crime records. The system improves accessibility, reduces paperwork, and enhances transparency in the crime reporting process.

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Experimental evaluation demonstrates that the proposed system successfully supports digital complaint submission, evidence management, and real-time complaint tracking. By leveraging modern mobile technologies and centralized data management, the platform contributes to the development of efficient and accessible digital policing systems.

Overall, the proposed solution provides a practical foundation for modern crime management platforms and has the potential to support future smart policing initiatives aimed at improving public safety and strengthening collaboration between citizens and law enforcement authorities.

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